IPP Unit # 2

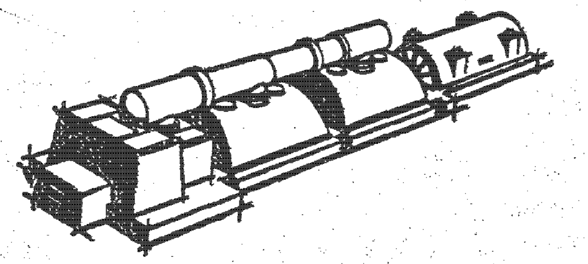
TURB PERF TESTS

GE Test Report

Date Tested 5/87

Report Date 4/88

A. Nissen
4/13/88



PERFORMANCE TEST REPORT

INTERMOUNTAIN POWER PROJECT
UNIT NO. 2

TURBINE NO. 270T151
820000 KW TC6F-30 3600 RPM
2400 PSIG 1000/1000F

GENERAL ELECTRIC

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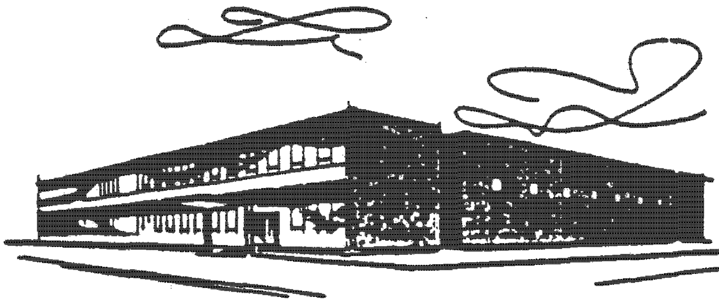

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Turbine Technology Department

SCHENECTADY, NEW YORK

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PERFORMANCE TEST REPORT
INTERMOUNTAIN POWER PROJECT
UNIT NO.2

BY

P.G. ALBERT

Tb.No.270T151
TC6F-30"LSB
2400 psig,1000/1000F,1.66/2.24/2.99"Hg ABS

820,000 KW
3600 RPM

DF87STG05 Class III February 26,1988

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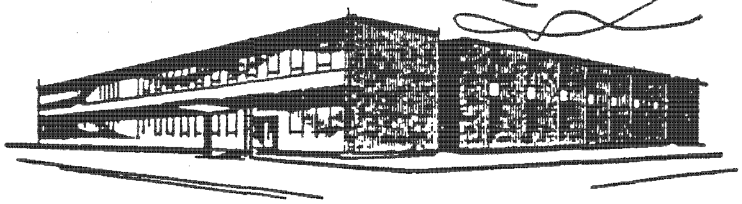

Turbine Technology Department

SCHENECTADY, NEW YORK

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INTERMOUNTAIN POWER PROJECT
UNIT NO.2

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Paul
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GENERAL ELECTRIC

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NO. DF87STG05

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I. INTRODUCTION

A full scale ASME performance test was run on the IPP #2 unit to determine the overall performance of the turbine relative to its guarantee. The tests were conducted through the cooperative efforts of General Electric Company and Intermountain Power Project.

The turbine-generator unit was intially synchronized in February 1987. Enthalpy drop efficiency tests were run on the high pressure (HP) and intermediate pressure (IP) turbines after startup to establish the efficiency levels for these components. The establishment of the startup performance level as soon as possible after initial synchronization is a necessary prerequisite to the running of an ASME full-scale acceptance test. This step provides the basis for identifying the presence of performance deviations which may occur in the time period before a full-scale test can be run.

Dates?

In May of 1987, the full-scale ASME performance test was conducted. The initial test point was performed for the primary purpose of instrument checkout, data taker training, isolation verification, and determining the efficiency of the HP and IP turbine sections. This data showed the HP turbine efficiency to have deteriorated 1.4% since startup and the IP turbine efficiency to have deteriorated 0.2%. Despite this deterioration, the performance test was conducted as originally planned. A series of nine full-scale ASME test points were then conducted from May 11 through May 16, 1987. This report presents the results of the full-scale performance test as well as the startup enthalpy drop test.

II. INSTRUMENTATION

The instrumentation and measurements required for a full scale test are described in detail in PTC-6 1976. A brief summary of the application of PTC-6 to the IPP #2 unit follows:

A. Description of Unit

The turbine is a tandem compound 3600 RPM design with a single flow HP turbine, a double flow IP turbine, and a six flow low pressure turbine with 30" last stage buckets. It is a single reheat design with rated steam conditions of 2400 psig/1000F/1000F and a nameplate rating of 820,000 KW at 1.66/2.24/2.99" HgA exhaust pressure. A cross-section of the HP turbine is given in Figure 1A, the IP turbine is shown in Figure 1B, and one of the three low pressure sections is shown in Figure 1C.

A schematic of the the turbine and feedwater cycle is given in Figure 2. The locations and types of measurements which were made are identified on this figure.

B. Pressures, Temperatures, Flows

Most of the instrumentation for the test was provided by the General Electric Company. Temperatures were measured using calibrated chromel constantan thermocouples with continuous leads from the hot junction to an electronic (real ice) ice bath. Per PTC-6 recommendations, temperatures which have the most influence on the test results were measured at two different points, close together, and the mean of the readings was considered to be the temperature of the fluid.

Transducers were used for the measuring the various pressures as well as the differential pressures across numerous flow elements. Many pressures were multiplexed to one transducer through the use of scanivalves. This justified the use of expensive, ultra high accuracy Ruska quartz bourdon tube transducers. Rosemount and Gemac transducers were used to measure differential pressures on secondary flow elements and

Heise pressure transducers were used for some static pressure measurements. Prior to the start of the test, an in-place calibration of transducers was performed.

The condensate flow to the deaerator was measured using an ASME primary-flow section which had a throat tap nozzle with a Beta ratio of 0.423 and a throat diameter of 9.842". Calibration of this flow section was completed by Alden Research Laboratory (ARL Report No. 112-84/C354) and the results are show in Figure 3. This flow section, which is the property of IPP, was inspected by IPP personnel a number of weeks prior to the test and found to be clean and undamaged. After completion of the test, GE recommended that the nozzle be inspected to verify that the nozzle remained clean during the test. However, the outage schedule never permitted inspection of this nozzle soon after the test. The differential pressure across the nozzle was measured on both sets of taps with Ruska DDR transducers. The temperature-controlled quartz bourdon tube transducers have an accuracy of 0.02% of reading plus 0.02% of full scale.

A calibrated flow section having a throat tap nozzle with a Beta ratio of 0.45 was used to measure the extraction steam flow to each of the two boiler feed pump turbines. The main steam attemperation spray flow was measured with a station pipe tap nozzle which was inspected by IPP prior to the test using the inspection port. A station orifice was used to measure the combustion gas reheat return to the deaerator. The feedpump injection flows where measured with six station orifices, one for each of the two main boiler feedpumps, one for the startup boiler feedpump, and one for each of the three booster boiler feedpumps. The feedpump seal return flows were measured with two calibrated turbine-meter flow sections which were provided by GE. Numerous flows in the steam seal system (see Figure 4) were measured with station orifices and forward-reverse tubes. No reheat attemperation spray flow or air preheat flow was used during the test.

C. Electrical Measurement

The generator electric load measurements were obtained using the following apparatus:

Electrical Apparatus Used	Serial No.	Phase
Current Transformers (customer's property)		
Potential Transformers (GE Property)	G425553	A
Type: JVS-150	G414871	B
Rating: 13800/120, 3000 VA, 60 Hz	K135196	C
Instruments (GE Property)	30809740	A
Precision Watthour Meters	30809742	B
Type: IBL-10 (Modified)	30809743	C
Rating: 2.5 Amp, 120 Volt, 60 Hz		

The precision watthour meters and the associated readout equipment were used to determine generator output of each of the three phases. These instruments were supplied by the General Electric Company along with a test cabinet for making all necessary electrical connections. The measuring setup was located in the control room.

The precision watthour meters were calibrated in Schenectady at the standards laboratory of Upstate New York Instrumentation Services, General Electric Company. During the calibration and the test, these meters operated in a temperature-controlled cabinet.

The potential transformers were calibrated at the General Electric Somersworth, New Hampshire plant. These calibrations provided the phase angle correction factors and the ratio correction factors for the potential transformers. The secondary burden consisted solely of our instruments. All transformers were grounded at their secondaries. During the testing, steam conditions and throttle flow were held as steady as possible to maintain steady generator load.

During each test, revolutions of the IBL-10 watthour meters were counted by electronic counters. The digital readout of these counters and the timer was photographed or recorded at precise 15-minute intervals. Phase voltages and currents were recorded by the data acquisition system. These values were used to determine the average armature current of each phase, average line-to-line voltage, and the power factor of the unit during each test. The value of generator hydrogen pressure was recorded during each test using the station instrumentation.

D. Data Acquisition

During the ASME performance test, a Hewlett-Packard 1000 data acquisition system was used for collection and reduction of test data. The computer has a 0.5 megabyte core memory with a 64 megabyte disc and is housed in a mobile trailer. For convenience, the mobile trailer was located on the turbine deck for the duration of the test.

Use of the system eliminated the need for about 20 data takers, thereby reducing the testing cost for the customer. In addition, the rate of recording data was increased and thus reducing data scatter uncertainty. Using both pressure multiplexing and computer input multiplexing, the scan time was about 3.7 minutes. The more important variables such as primary flow were read more frequently (once every 28 seconds).

During a test point, the system allowed complete visibility of the data as it was logged and stored on magnetic tape. Upon completion of a test point, a hard copy of the raw data was printed, along with corresponding scan times and averaged values converted to engineering units. The system could also be used to perform heat balance calculations for determining detailed turbine performance results as well as information on the performance of other components of the cycle.

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E. Cycle Isolation

For all test points, a number of valves were closed to prevent unaccounted-for flows from entering or leaving the test cycle or bypassing any cycle component. Many lines were isolated by closing two isolation valves and opening a drain between the valves to verify no leakage. For steam line drains to the condenser, the drain line temperature near the condenser was checked to verify that the single isolation valve was not leaking. During the initial test, some drain valves were found to be leaking, but these isolation problems were corrected by closing additional drain line valves.

The No. 1 and No. 2 low pressure heater continuous vents were not isolated to avoid the heater from becoming air bound during a test point. These heater vent leakage flows were estimated to be insignificant to overall performance and no correction was made in the heat balance calculations for this performance loss.

The unaccounted-for flow leaving the cycle was about 0.1% of the valve wide open throttle flow. Some identified sources for this leakage were the deaerator drain and two relief valves from the final feedwater line.

III. CALCULATIONS

Ten test points were run during the period May 9 through May 16, 1987 which covered three valve best point operating conditions: second, third, fourth, or VWO condition. Test point 1 was considered a preliminary test whose main objective was to provide a check on the cycle isolation and instrumentation. Several isolation deficiencies and instrumentation problems were discovered and corrected. Test points 2, 4, 5, 6, 7, 8, and 10 were run with the cycle in the design mode of operation. Test points 3 and 9 were run with the total flow from the heater #2 drain going to the condenser. Test point 8 was run at VWO over

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pressure. A summary of test conditions for these test points is given in Figure 5.

The test data which was recorded and stored on a magnetic tape during each test point was printed, along with averaged values converted to engineering units and corrected for water legs, barometric pressure, and instrumentation calibration. The data was then posted on a copy of the instrument diagram (Figure 2) and reviewed for errors, inconsistencies, completeness, etc. An example of a completed posting diagram developed for test point 6 is shown in Figure 6.

The electrical load was calculated from the data obtained from the measurements described in Section II-C by the formula:

Load = Rev. x 60 min./test time (min.) x K x WHMCF x CTRCF x PTRCF x CTMR x PTMR

where:

K	=	Watthour Meter Constant
WHMCF	=	Watthour Meter Correction Factor
CTRCF	=	Current Transformer Ratio Correction Factor
PTRCF	=	Potential Transformer Ratio Correction Factor
CTMR	=	Current Transformer Marked Ratio
PTMR	=	Potential Transformer Marked Ratio

These calculations are done for each phase and the sum of them is the total generator load. Generator data for the average armature current of the phases, the average line-to-line voltage, and the hydrogen pressure are listed in Table I. The test generator load and power factor (PF) are listed in Table II. Comparisons were made between the electrical measurements made by General Electric and the readings obtained from the station computer. These results, given in Table III, show computer point TGBPKO to read within 0.1% of the test electrical load equipment and computer point COAXIO read about 0.25% <u>less</u> MW output. The generator losses are shown in Figure 7.

Table I
Generator Data

Test No.	Avg. Armature Current of 3 Phases	Avg. Line-To-Line Voltage	H_2 Pressure Psig
2	19429	25772	64
3	13410	25736	58
4	19505	25743	64
5	17960	25644	61
6	19554	25699	64
7	17428	25634	62
8	20213	25608	63
9	13614	25532	63
10	17818	25618	63

Table II
Generator Load

Test No.	Date	Time	KW	PF
2	5/11/87	14:15 - 16:15	855960	0.987
3	5/13/87	04:30 - 06:30	592031	0.991
4	5/13/87	01:45 - 13:30	859850	0.989
5	5/14/87	03:30 - 05:30	785980	1.000
6	5/14/87	08:30 - 10:30	860755	0.989
7	5/15/87	03:15 - 05:15	775096	1.002
8	5/15/87	08:30 - 10:30	898356	1.002
9	5/16/87	04:15 - 06:15	599736	0.996
10	5/16/87	13:30 - 15:30	789272	0.998

Table III

Test No.	GE Measured (MW)	Station Computer (MW) TGBPKO	% Diff.	Station Computer (MW) COAXIO	%Diff
2	855.960	855.17	-0.09%	853.85	-0.25%
3	592.031	592.19	0.03%	590.85	-0.20%
4	859.850	859.82	0.00%	857.92	-0.22%
5	785.980	785.66	-0.04%	783.30	-0.34%
6	860.755	860.67	-0.01%	858.63	-0.25%
7	775.096	774.50	-0.08%	777.20	0.27%
8	898.356	--	--	--	-
9	599.740	599.12	-0.10%	598.31	-0.24%
10	789.270	787.51	0.03%	786.57	-0.34%

The performance of the test cycle was calculated by supplying the measurements identified on the posting diagram for each test point to a computerized heat balance model of the turbine cycle. A sample calculation can be found in the ASME PTC-6 Appendix A to Test Code for Steam Turbines. All calculations have been performed using ASME steam properities. The computer output for the test cycle calculations is contained in Appendix A. The output for each test point contains detailed turbine performance results as well as information on the heaters, pumps, and other components of the cycle. The information contained in Appendix A for test point 6 is summarized on the test cycle heat balance diagram of Figure 8.

The expansion line end point (ELEP) was calculated by subtracting the appropriate exhaust loss obtained from the curve given in Figure 8A from the measured used energy end point (UEEP). It is noted that the exhaust loss curve shown in Figure 8A is based on data obtained from numerous tests which were conducted on similar turbines with 30" last stage buckets and also from data obtained on laboratory models.

With the test performance characteristics of the turbine established, the contract cycle analysis was then conducted. The contract cycle analysis provides the final results which are used to compare the test performance with the guarantee performance of the turbine. Contract cycle analysis restores the performance of all the cycle components <u>except</u> the turbine to their respective design values while maintaining the test performance characteristics of the turbine. The test characteristics for the turbine and the steam conditions taken from test cycle are:

1. High pressure turbine efficiency
2. Reheat turbine efficiency (UEEP)
3. Packing flows and rotor cooling steam flow
4. Stage flow functions
5. Hot extractions *
6. Throttle flow
7. Throttle pressure
8. Throttle temperature
9. Reheat temperature
10. Exhaust pressure

* Hot extractions refer to the difference between the test extraction enthalpy and the corresponding stage test expansion line enthalpy.

The exhaust loss given by Figure 8A was used in the contract cycle analysis calculations to relate the UEEP and ELEP enthalpies. A method of performing contract cycle calculations is shown in the ASME PTC-6 Appendix A to Test Code for Steam Turbines.

Contract cycle calculations were performed on eight test points which covered the three valve best point operating conditions: second, third, fourth, or VWO conditions. The flows, pressures, enthalpies, output, and heat rate obtained in the contract cycle analysis are shown on the heat balance diagrams of Figures 9A-9H for test points 2,3,4,5,6,7,9, and 10, respectively. Note that the turbine auxilary power requirements of 175 KW's have been accounted for by including them in the fixed losses. The test cycle fixed losses were 4353 KW and the contract cycle fixed losses were 4528 KW. The correction of output and heat rate to design steam conditions is discussed in Section IV-4.

IV. RESULTS

A summary of pertinent results from both the test cycle and the contract cycle analysis follows:

1. HP Turbine Efficiency

The efficiency of the HP turbine was measured * during each test point. The results are plotted on Figure 10 as a function of throttle flow ratio (TFR) which is the ratio of the throttle flow to the valves wide open (VWO) throttle flow. The efficiencies and the TFR have been corrected to rated throttle conditions of 2400 psig/1000F. The efficiencies obtained from the design heat balances are included. For the VWO points (test points 2,4,6, and 8) the test efficiency is 2.0% better than the design VWO heat balance. This is worth an estimated 0.3% in turbine heat rate.

* Appendix D describes the measurement and calculation of HP and IP efficiency.

The efficiency of the HP turbine deteriorated since the initial performance was established at startup. This is shown in Figure 11, which includes the results of the data taken during the enthalpy drop tests and the full-scale tests. The efficiency established at startup was 1.4% better than the full-scale test. This loss of HP efficiency is worth about 0.25% in turbine heat rate. The ratio of the first stage pressure to throttle pressure for a given valve point has also decreased from the initial test obtained at startup. This could indicate a decrease in flow capacity due to a restriction in the first stage or valves, or an increase in leakage flow from the first stage such as cooling steam flow and N2 packing flows.

2. IP Turbine Efficiency

The efficiency of the IP turbine was also measured during each test point. This efficiency is defined from ahead of the combined reheat valves to the LP bowl. The results obtained during the full-scale test are plotted in Figure 12, along with those previously obtained from the enthalpy drop test. The IP turbine efficiency showed about 0.2% deterioration from what was established at startup.

3. Reheat Turbine Efficiency IP-LP combined

The reheat turbine efficiency reflects the combined performance of the IP and low pressure sections. It is measured from the initial conditions defined by the pressure just ahead of the Combined Intercept Valves (CIV's) and bowl enthalpy to the endpoint conditions defined at the exit of the low pressure turbine. Unlike the HP and IP efficiencies discussed above, reheat efficiency can only be determined by performing a full-scale test since a heat balance around the entire turbine in required to determine the used energy endpoint (UEEP) at the low pressure turbine exhaust. Hence, no data for the reheat efficiency was available from the previous enthalpy drop tests which were run prior to the full-scale test.

The results of the reheat turbine UEEP efficiency are presented in Figure 13. These results have been corrected to 1000F reheat temperature. The level of efficiency indicated by the test curve is equal to the design curve.

Need individual LP Breakdowns

Results for the reheat turbine efficiency based on the expansion line endpoint (ELEP) are shown in Figure 14. The annulus velocity used to calculate and plot the ELEP efficiency was based on the three exhaust pressures obtained in each of the three hoods rather than the combined average exhaust pressure for all three hoods. For each test point, the exhaust loss was determined for each of the three hoods and the average exhaust loss was then used to calculate the ELEP efficiency. The test level of performance is better than the design level of performance.

4. Output and Heat Rate

A. Test Cycle

The test value of the major variables which affect turbine and cycle performance are shown in Appendix C along with the test cycle results for output and heat rate. This data has been used in conjunction with the correction curves for throttle pressures, throttle temperature, reheat temperature and exhaust pressure, which are given in Appendix B, to obtain values for the test output and heat rate corresponding to the rated conditions of 2400 psig, 1000/1000F, 1.66/2.24/2.99 HgA, 0.9 power factor, and H_2 pressure of 63 psig. The final values for test output and heat rate at rated conditions have been plotted in the form of test heat rate versus test load in Figure 15. The design curve shown is based on the design heat balances which include 1% cycle makeup and a heat rate definition with heat input by the condensate pump and for 0.1% boiler blowdown flow.

B. Contract Cycle

As noted earlier in Section III, the results of the contract cycle analysis provided the test turbine performance with all other components in the cycle performing at their respective design performance levels. The contract cycle analysis provides the results for turbine output and heat rate which are used to compare the test performance with guarantee. Table IV contains a summary of the contract cycle results for output and heat rate. Both have been corrected to rated conditions using the same correction factors listed in Appendix C. The corrected data is plotted in Figure 16 which also contains the design heat rate curve.

The contract cycle test heat rate was compared to the guarantee value using the method outlined in the turbine-generator contract. First, the equation for the straight line between the design heat balance heat rates at the third valve point and valves wide open was determined. Second, the difference between the heat rate at 820,000 KW from the straight line equation and the specified contract 820,000 KW guaranteed heat rate was calculated to be 6.9BTU/KW-HR. Third, the test heat rate at 820,000 KW was calculated from a straight line equation between the test heat rates at the third valve point and the valves wide open. The resultant corrected test heat rate at 820,000 KW was then determined by subtracting the 6.9 BTU/KW-HR obtained in step 2 from the straight line interpolation of the test heat rate obtained in step 3. This corrected test heat rate is 7793.0 BTU/KW-HR and guarantee value is 7816 BTU/KW-HR (See the guarantee heat balance 481HB111 shown in Figure 17A). The test value is better than guarantee by 23.0 BTU/KW-HR or 0.3%. The test heat rate is considerably better than the design level over the entire tested load range. This difference is primarily attributed to the better stage performance of all turbine sections relative to design.

Using the startup levels of HP and IP efficiency, the corrected contract cycle heat rates would have been 0.55% better than guarantee.

The VWO test output of 872781 KW (Average of test points 2,4, and 6) exceeds the guarantee value of 820,000 KW by 6.4% and design VWO value by 2.5%. The measured VWO throttle flow corrected to 2400 psig/1000F is 6,271,150 LB/HR (average of test points 2,4, and 6) which exceeds the design VWO throttle of 6,122,730 LB/HR by 2.4%.

Table IV

Summary - Contract Cycle Analysis
Generator Output

add Test Output

Test Point	Contract Cycle * Output	Contract Cycle Output** Corrected to Rated Conditions
2	843805 KW	374951 KW
3	586602 KW	602734 KW
4	847509 KW	872168 KW
5	775180 KW	795887 KW
6	848153 KW	371223 KW
7	763183 KW	788467 KW
9	593082 KW	594212 KW
10	777947 KW	794286 KW

Heat Rate

add Test HR

Test Point	Contract Cycle * Heat Rate	Contract Cycle Heat Rate** Corrected to Rated Conditions
2	7958.9	7767.2
3	8084.6	7916.5
4	7984.9	7791.4
5	7977.7	7812.4
6	7951.3	7777.4
7	7996.9	7811.6
9	7872.3	7928.7
10	7897.2	7808.4

Contract Cycle * [corrected for PF, H_2, MU] Calculated for the test conditions of throttle pressure and temperature, reheat temperature, and exhaust pressure. The power factor and hydrogen pressure were 0.90 and 63 psig, respectively. Makeup of 1.0 %.

Contract Cycle plus rated conditions ** [Corrected for Mstm T+P, HRH T, ΔP RH, BP] The corrections used for throttle pressure, throttle temperature, reheat temperature, and exhaust pressure are listed in Appendix C.

5. **Stage Flow Functions**

The flow function for a stage is defined by the relationship:

$$\text{Stage Flow Function} = Q/(A\sqrt{P/v})$$

where:

Q = Flow to the following areas

A = Stage nozzle area

P = Stage shell pressure

v = Specific volume at the stage shell pressure and temperature

The flow function should have a constant value which is usually independent of load. Plots of this function will reflect any errors that may exist in the measurement of flow, pressure, or temperature at a specified point in the cycle. Its consistency is a measure of the precision of the test.

Plots of the flow functions calculated for those locations in the turbine where pressures and temperatures were measured (see Figure 2) are given in Figures 19-28. Generally, the values from each test point line up very well for each respective location demonstrating good consistency and, therefore, good precision.

The flow functions obtained for the positions in the HP turbine (Figures 19 and 20) exhibit a positive slope with flow to the following stage (i.e., load). This relationship is common to other large single-flow fossil, high pressure turbines. The remaining plots contain the results for locations in the IP and LP turbines. The first stage pressure has been plotted versus throttle flow in Figure 18.

6. Packing Flows

The turbine shaft packing flows were measured (see Figure 2) during the ASME performance test. The more significant flows are plotted in Figures 29-34. The HP turbine high pressure packing flows are plotted versus throttle flow in Figures 29 and 30 while the low pressure packing leakoff flows are shown in Figures 31 and 32. The IP turbine shaft packing flows to the steam seal header are shown in Figures 33 and 34.

The packing flow constants determined from these test results have been used in the contract cycle calculation. However, packing flows have only a small effect on heat rate.

V. CONCLUSION

The IPP #2 turbine-generator unit is 23.0 BTU/KW-HR or 0.3% better than guarantee at the guarantee output of 820,000 KW. The performance level of the unit is considerably better than design over the entire load range. The maximum contract cycle KW output at rated conditions is 872,781 KW. This exceeds the design VWO value of 851,733 KW by 2.5%. The maximum test throttle flow at rated steam conditions is 6,271,150 lb/hr., which is greater than the valves wide open (VWO) throttle flow of 6,122,730 lb/hr by 2.4%. The HP turbine section efficiency is 2.0% better than design at VWO, while at startup, it was 3.4% better than design. The reheat turbine efficiency, which reflects the combined performance of the IP and low pressure turbine sections, is on the average 0.2% better than design when corrected to rated reheat temperature.

RESULTS

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Title Page

AUTHOR	SUBJECT	NO
P.G. Albert	Full Scale ASME Performance Test	DF87STG05
		DATE 3/3/88

TITLE	
Intermountain Power Project Unit #2, 270T151 820,000 KW, 2400P/1000F/1000F, 2.3" HgA	G.E. CLASS III
	GOVT.CLASS NONE
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SUMMARY

This report presents the results obtained from a full scale ASME performance test conducted on the IPP unit #2. The results show that:

- The turbine test heat rate at the guarantee load of 820,000 KW, rated conditions of 2400 psig/1000F/1000F, 1.66/2.24/2.99" Hg, and the contract cycle conditions is 7793.0 BTU/KW-HR, which is 0.3% better than guarantee. This excellent performance is consistent over the load range.

- The maximum contract cycle generator output corrected to rated conditions is 872,781 KW, which exceeds the valves wide open output by 2.5%.

- The maximum test throttle flow at rated throttle steam conditions is 6,271,150 lb./hr., which is greater than the valves wide open throttle flow by 2.4%.

KEY WORDS

ASME test, full scale test, performance test, efficiency, Intermountain Power Project, IPP #2.

INFORMATION PREPARED FOR Steam Turbine-Generator Engrg. & Manufacturing Operations

TESTS MADE BY Intermountain Power Project and General Electric Company

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AUTHORIZATION, CLASS AND DISTRIBUTION APPROVED

SIGNATURE, SPONSORING MANAGER

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.013-8 (7-70)
PHOTO OFFSET-TOS

APPENDIX C

Correction To Heat Rate and Load

Notes:

Page C2 shows the measured values of heat rate and load corrected for group 2 corrections. These corrections include power factor, H_2 pressure, throttle pressure, throttle temperature, reheat temperature and exhaust pressure. No correction for off-design cycle conditions are included in the corrected test heat rate and load.

Page C3 shows the contract cycle heat rates and loads which represent the measured heat rate corrected to the specified cycle on the guarantee heat balance (i.e., group 1 corrections). The corrected contract cycle heat rates and loads have also been corrected for group 2 corrections and these are the final values of heat rate and load to compare to the guarantee values.

INTERMOUNTAIN POWER PROJECT
UNIT #2. 2701151

Test Summary Conditions

TEST HEAT RATE AND LOAD

TEST POINT	2	3	4	5	6	7	8	9	10
SUMMARY OF TEST CONDITIONS:									
MEAS'D LOAD	855960	592031	859850	785980	860755	775096	898356	599736	789272
THROTTLE FLOW	6183909	4056100	6220163	5570279	6224013	5477861	6496919	3978528	5527099
THROTTLE PRESS.	2384.1	2399.8	2394	2393.8	2394.2	2388.9	2477.14	2393.3	2382.4
THROTTLE TEMP.	1004.9	1007.2	1000.8	1001.5	996.5	1006.6	988.2	1008.8	1001.7
HOT REHEAT TEMP.	1000.2	1001.3	1009.2	1006.2	1003.1	1004.3	996.3	1001.6	1007.5
EXHAUST PRESS.	3.739	3.074	3.809	3.403	3.599	3.513	3.195	2.063	2.956
POWER FACTOR	0.987	0.991	0.989	1	0.989	1	1	0.996	0.998
H2 PRESSURE	64	58	64	64	64	62	63	63	63
TEST HEAT RATE	7863.6	7986.8	7863.3	7866.2	7855	7872.3	7772.3	7762.8	7791.8
TEST LOAD	855119	591526	858986	785201	859887	774305	898356	599283	788480
HEAT RATE CORRECTIONS (dividing factors):									
PT	1.0007	1.0006	1.0005	1.0006	1.0005	1.0008	0.9983	1.0009	1.0010
TT	0.9993	0.9990	0.9999	0.9998	1.0006	0.9990	1.0019	0.9988	0.9997
THRH	1.0000	0.9998	0.9987	0.9991	0.9996	0.9994	1.0005	0.9997	0.9989
PEXH	1.0247	1.0219	1.0258	1.0217	1.0216	1.0245	1.0127	0.9935	1.0118
COMBINED CORR	1.0247	1.0212	1.0248	1.0211	1.0224	1.0237	1.0134	0.9929	1.0114
LOAD CORRECTIONS (dividing factors):									
PT	0.9885	0.9946	0.9926	0.9923	0.9927	0.9903	1.0264	0.9917	0.9876
TT	0.9996	0.9993	0.9999	0.9999	1.0004	0.9994	1.0012	0.9991	0.9999
THRH	1.0001	1.0006	1.0043	1.0029	1.0015	1.0020	0.9983	1.0008	1.0035
PEXH	0.9759	0.9786	0.9749	0.9788	0.9788	0.9760	0.9875	1.0066	0.9884
COMBINED CORR	0.9644	0.9732	0.9717	0.9740	0.9735	0.9679	1.0130	0.9981	0.9794
CORR TEST HEAT RATE	7674.2	7820.7	7692.2	7703.3	7683.2	7689.9	7669.5	7818.4	7704.2
CORR TEST LOAD	886683	607794	883979	806176	883276	799958	886810	600425	805040

FIG. C2

IP14_004852

INTERMOUNTAIN POWER PROJECT
UNIT #2, 270T151

C O N T R A C T   C Y C L E   H E A T   R A T E   A N D   L O A D

TEST POINT	2	3	4	5	6	7	8	9	10
SUMMARY OF TEST CONDITIONS:									
MEAS'D LOAD	855960	592031	859850	785980	860755	775096	898356	599736	789272
THROTTLE FLOW	6183909	4056100	6220163	5570279	6224013	5477861	6496919	3978528	5527099
THROTTLE PRESS.	2384.1	2399.8	2394	2393.8	2394.2	2388.9	2477.14	2393.3	2382.4
THROTTLE TEMP.	1004.9	1007.2	1000.8	1001.5	996.5	1006.6	988.2	1008.8	1001.7
HOT REHEAT TEMP.	1000.2	1001.3	1009.2	1006.2	1003.1	1004.3	996.3	1001.6	1007.5
EXHAUST PRESS.	3.739	3.074	3.809	3.403	3.599	3.513	3.195	2.063	2.956
POWER FACTOR	0.987	0.991	0.989	1	0.989	1	1	0.996	0.998
H2 PRESSURE	64	58	64	64	64	62	63	63	63
CONTRACT CYCLE									
HEAT RATE	7958.85	8084.63	7984.94	7977.65	7951.25	7996.85	---------	7872.34	7897.17
LOAD	843804.9	586602	847508.8	775179.5	848153	763182.6	---------	593081.5	777947.4
HEAT RATE CORRECTIONS (dividing factors):									
PT	1.0007	1.0006	1.0005	1.0006	1.0005	1.0008	0.9983	1.0009	1.0010
TT	0.9993	0.9990	0.9999	0.9998	1.0006	0.9990	1.0019	0.9988	0.9997
THRH	1.0000	0.9998	0.9987	0.9991	0.9996	0.9994	1.0005	0.9997	0.9989
PEXH	1.0247	1.0219	1.0258	1.0217	1.0216	1.0245	1.0127	0.9935	1.0118
COMBINED CORR	1.0247	1.0212	1.0248	1.0211	1.0224	1.0237	1.0134	0.9929	1.0114
LOAD CORRECTIONS (dividing factors):									
PT	0.9885	0.9946	0.9926	0.9923	0.9927	0.9903	1.0264	0.9917	0.9876
TT	0.9996	0.9993	0.9999	0.9999	1.0004	0.9994	1.0012	0.9991	0.9999
THRH	1.0001	1.0006	1.0043	1.0029	1.0015	1.0020	0.9983	1.0008	1.0035
PEXH	0.9759	0.9786	0.9749	0.9788	0.9788	0.9760	0.9875	1.0066	0.9884
COMBINED CORR	0.9644	0.9732	0.9717	0.9740	0.9735	0.9679	1.0130	0.9981	0.9794
CORR TEST HEAT RATE	7767.2	7916.5	7791.4	7812.4	7777.4	7811.6	---------	7928.7	7808.4
CORR TEST LOAD	874951	602734	872168	795887	871223	788467	---------	594212	794286

FIG. C3

IP14_004853

Actual

SUMMARY OF TEST CONDITIONS

TEST PT.	2	3	4	5	6	7	8	9	10
VALVE PT.	VWO	2nd	VWO	3rd	VWO	3rd	VWO	2nd	3rd
LOAD (MW)	855.96	592.03	859.85	785.98	860.76	775.10	898.36	599.74	789.27
THROTTLE FLOW (LB/HR)	6183909	4056100	6220163	5570279	6224013	5477861	6496919	3978528	5527099
THROTTLE PRESS. (PSIA)	2384.1	2399.8	2394.0	2393.8	2394.2	2388.9	2477.1	2393.3	2382.4
THROTTLE TEMP. (F)	1004.9	1007.2	1000.8	1001.5	996.5	1006.6	988.2	1008.8	1001.7
FIRST STAGE PRESS.	1918.0	1235.5	1926.2	1714.3	1927.3	1689.8	1992.9	1212.3	1698.8
HOT REHEAT PRESS.	521.4	354.							
HOT REHEAT TEMP.	1000.20	1001							
COLD REHEAT PRESS.	566.0	384.							
COLD REHEAT TEMP.	625.1	566.							
LP BOWL PRESS.	118.5	81.0							
CROSSOVER TEMP.	617.2	621.							
LP EXH. PRESS. ("HG) psia	1.836	1.51							
FINAL FW TEMP.	552.1	508.							

Need: A single page summary for each test point

① Test Conditions

② Corrected to Contract Cycle

③ Corrected to Contract Cycle @ rated conditions

Listing magnitude of each correction.

FIG. 5

IP14_004854

Actual

SUMMARY OF TEST CONDITIONS

TEST PT.	2	3	4	5	6	7	8	9	10
VALVE PT.	VWO	2nd	VWO	3rd	VWO	3rd	VWO	2nd	3rd
LOAD (MW)	855.96	592.03	859.85	785.98	860.76	775.10	898.36	599.74	789.27
THROTTLE FLOW (LB/HR)	6183909	4056100	6220163	5570279	6224013	5477861	6496919	3978528	5527099
THROTTLE PRESS. (PSIA)	2384.1	2399.8	2394.0	2393.8	2394.2	2388.9	2477.1	2393.3	2382.4
THROTTLE TEMP. (F)	1004.9	1007.2	1000.8	1001.5	996.5	1006.6	988.2	1008.8	1001.7
FIRST STAGE PRESS.	1918.0	1235.5	1926.2	1714.3	1927.3	1689.8	1992.9	1212.3	1698.8
HOT REHEAT PRESS.	521.4	354.0	526.1	475.0	527.6	467.6	544.5	348.7	473.0
HOT REHEAT TEMP.	1000.20	1001.30	1009.20	1006.20	1003.10	1004.30	996.30	1001.60	1007.50
COLD REHEAT PRESS.	566.0	384.3	571.2	514.8	571.5	507.0	590.0	378.4	512.7
COLD REHEAT TEMP.	625.1	566.8	623.0	606.1	619.3	607.3	612.1	565.5	606.5
LP BOWL PRESS.	118.5	81.0	118.9	107.5	118.6	106.1	122.7	79.5	107.5
CROSSOVER TEMP.	617.2	621.2	623.6	622.9	618.8	621.5	612.8	622.1	624.6
LP EXH. PRESS. psia ("HG)	1.836	1.510	1.871	1.671	1.768	1.725	1.569	1.013	1.452
FINAL FW TEMP.	552.1	508.5	551.9	540.9	551.6	539.1	554.3	506.5	540.7

FIG. 5

Fig. 5

SUMMARY OF TEST CONDITIONS

TEST PT.	2	3	4	5	6	7	8	9	10
VALVE PT.	VWO	2nd	VWO	3rd	VWO	3rd	VWO	2nd	3rd
LOAD (MW)	855.96	592.03	859.85	785.98	860.76	775.10	898.36	599.74	789.27
THROTTLE FLOW (LB/HR)	6183909	4056100	6220163	5570279	6224013	5477861	6496919	3978528	5527099
THROTTLE PRESS. (PSIA)	2384.1	2399.8	2394.0	2393.8	2394.2	2388.9	2477.1	2393.3	2382.4
THROTTLE TEMP. (F)	1004.9	1007.2	1000.8	1001.5	996.5	1006.6	988.2	1008.8	1001.7
FIRST STAGE PRESS.	1918.0	1235.5	1926.2	1714.3	1927.3	1689.8	1992.9	1212.3	1698.8
HOT REHEAT PRESS.	521.4	354.0	526.1	475.0	527.6	467.6	544.5	348.7	473.0
HOT REHEAT TEMP.	1000.20	1001.30	1009.20	1006.20	1003.10	1004.30	996.30	1001.60	1007.50
COLD REHEAT PRESS.	566.0	384.3	571.2	514.8	571.5	507.0	590.0	378.4	512.7
COLD REHEAT TEMP.	625.1	566.8	623.0	606.1	619.3	607.3	612.1	565.5	606.5
LP BOWL PRESS.	118.5	81.0	118.9	107.5	118.6	106.1	122.7	79.5	107.5
CROSSOVER TEMP.	617.2	621.2	623.6	622.9	618.8	621.5	612.8	622.1	624.6
LP EXH. PRESS. ("HG)	1.836	1.510	1.871	1.671	1.768	1.725	1.569	1.013	1.452
FINAL FW TEMP.	552.1	508.5	551.9	540.9	551.6	539.1	554.3	506.5	540.7

FIG. 5

Fig. 5

IP14_004856

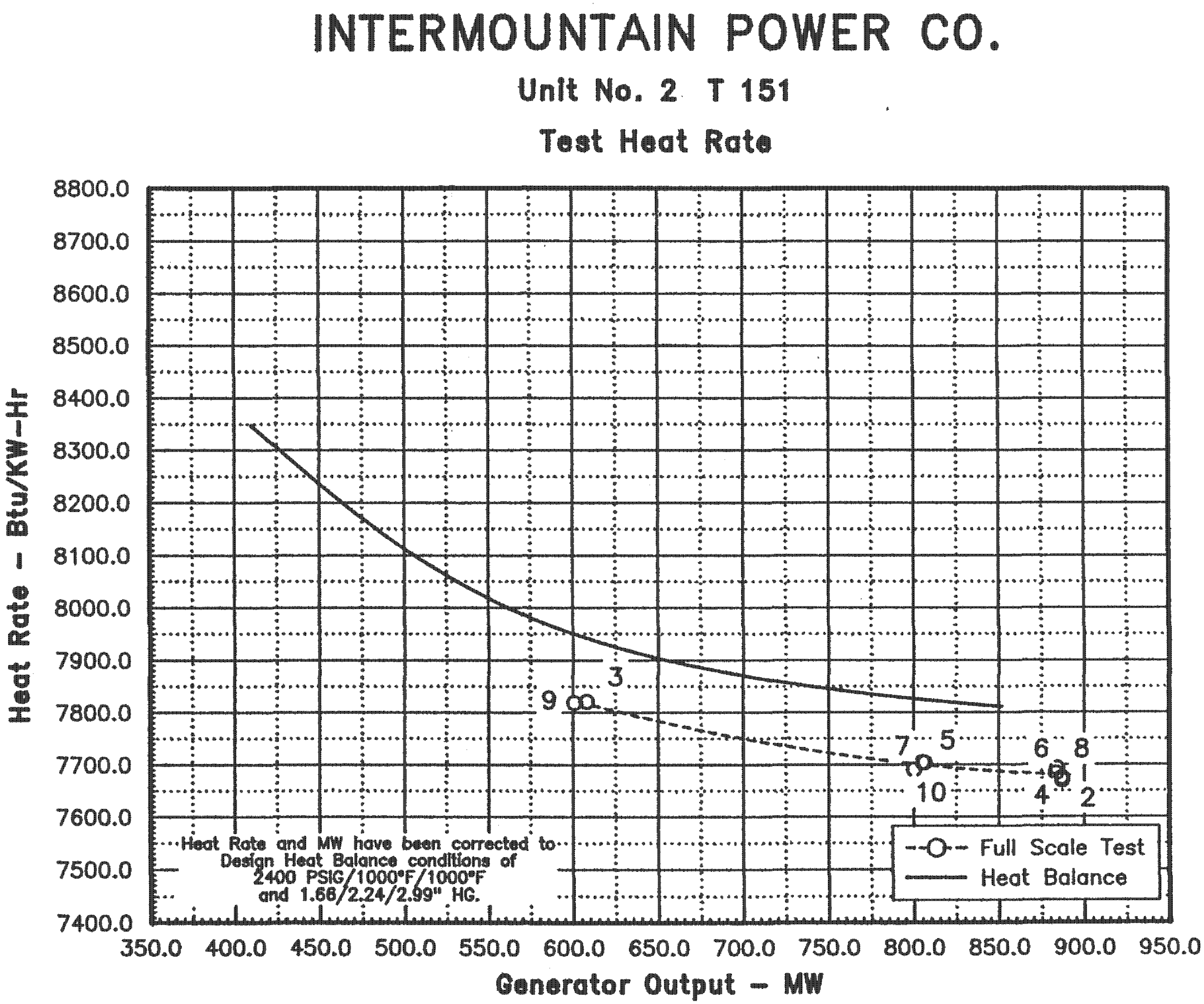


Fig. 15

Figure 15

IP14_004857

INTERMOUNTAIN POWER CO.

Unit No. 2 T 151

Contract Cycle Heat Rate

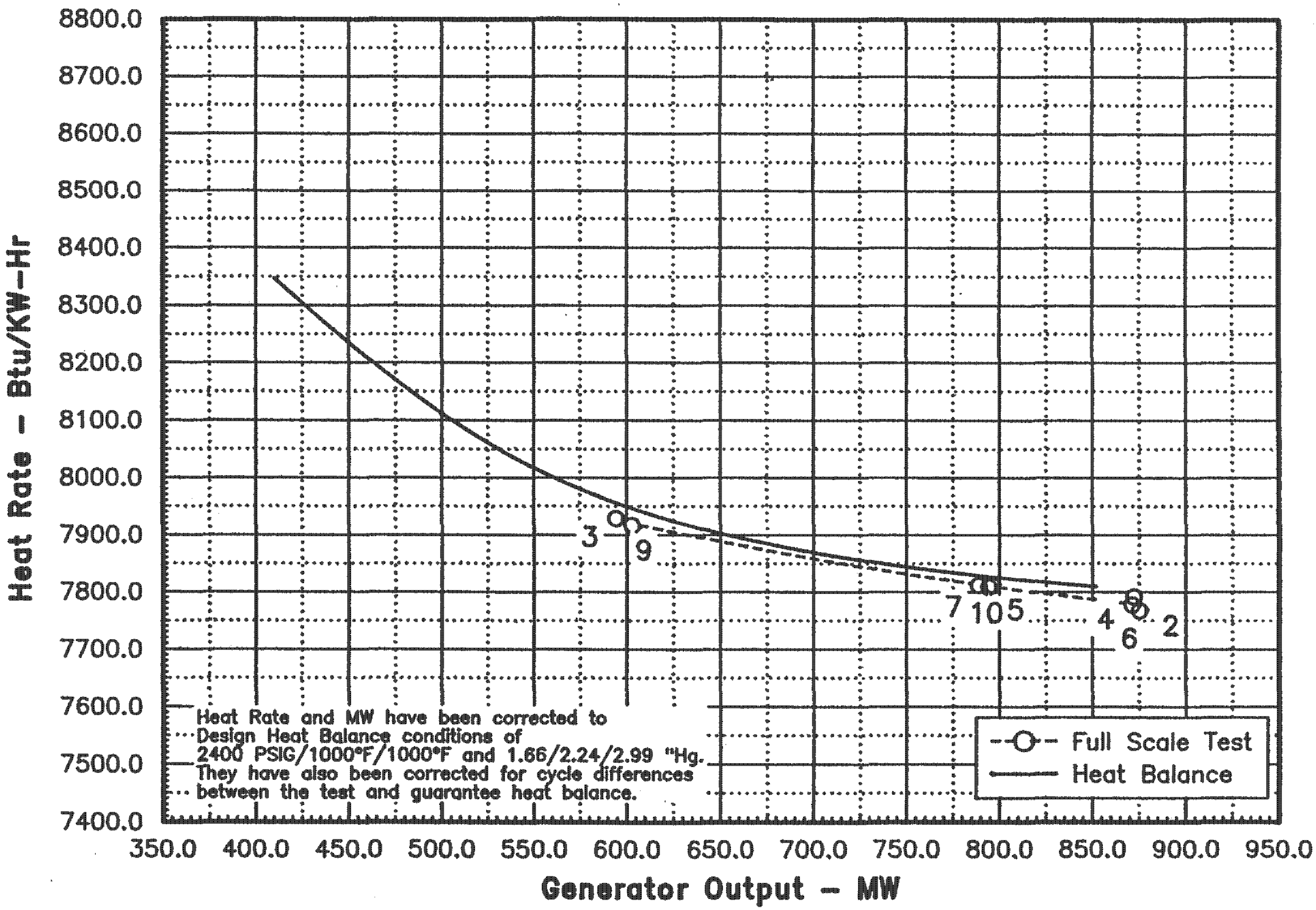


Fig. 16

Figure 16

INTERMOUNTAIN POWER CO.

Unit No. 2 T 151

High Pressure Section Efficiency

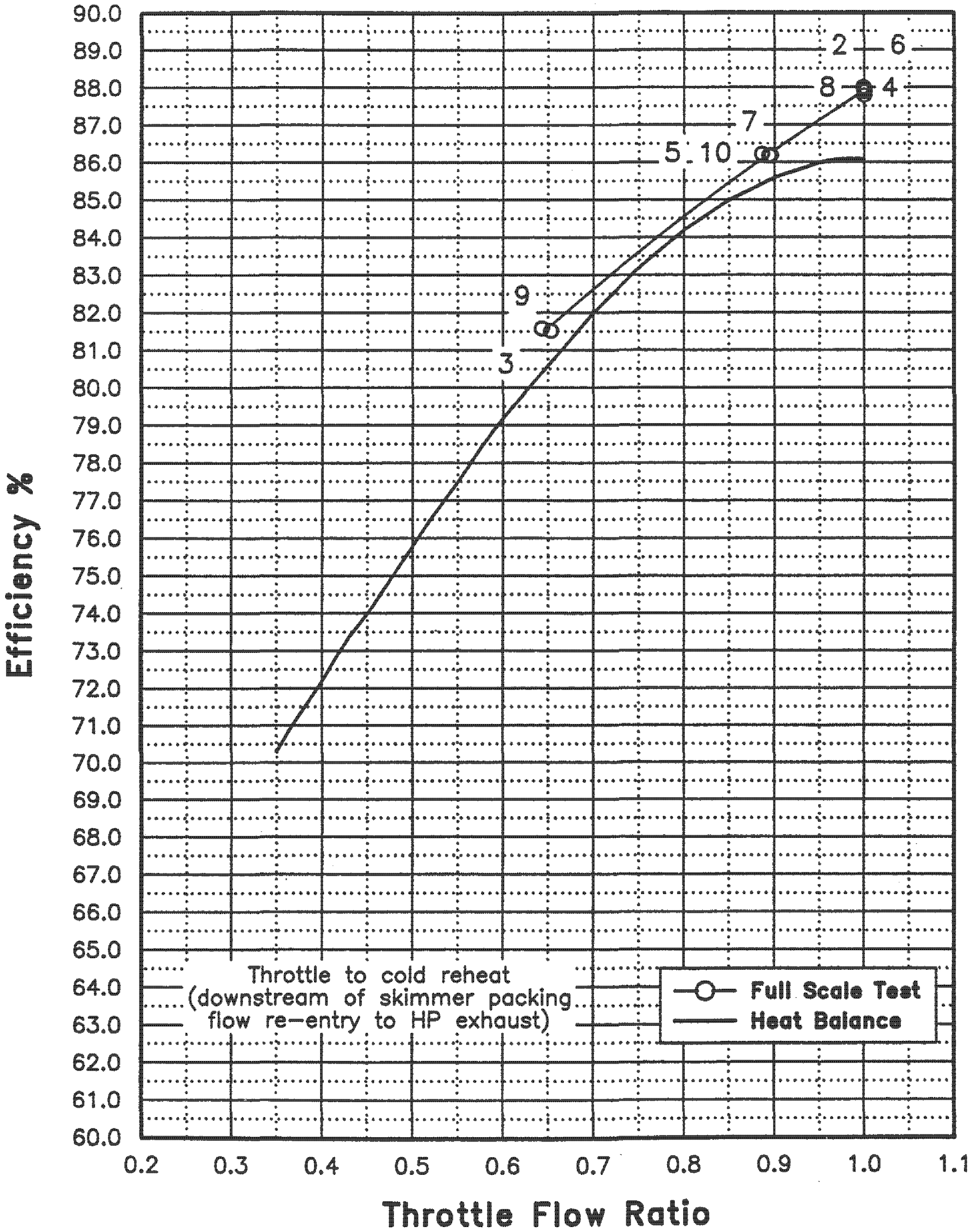


Figure 10

IP14_004859

INTERMOUNTAIN POWER CO.

Unit No. 2 T 151

High Pressure Section Efficiency

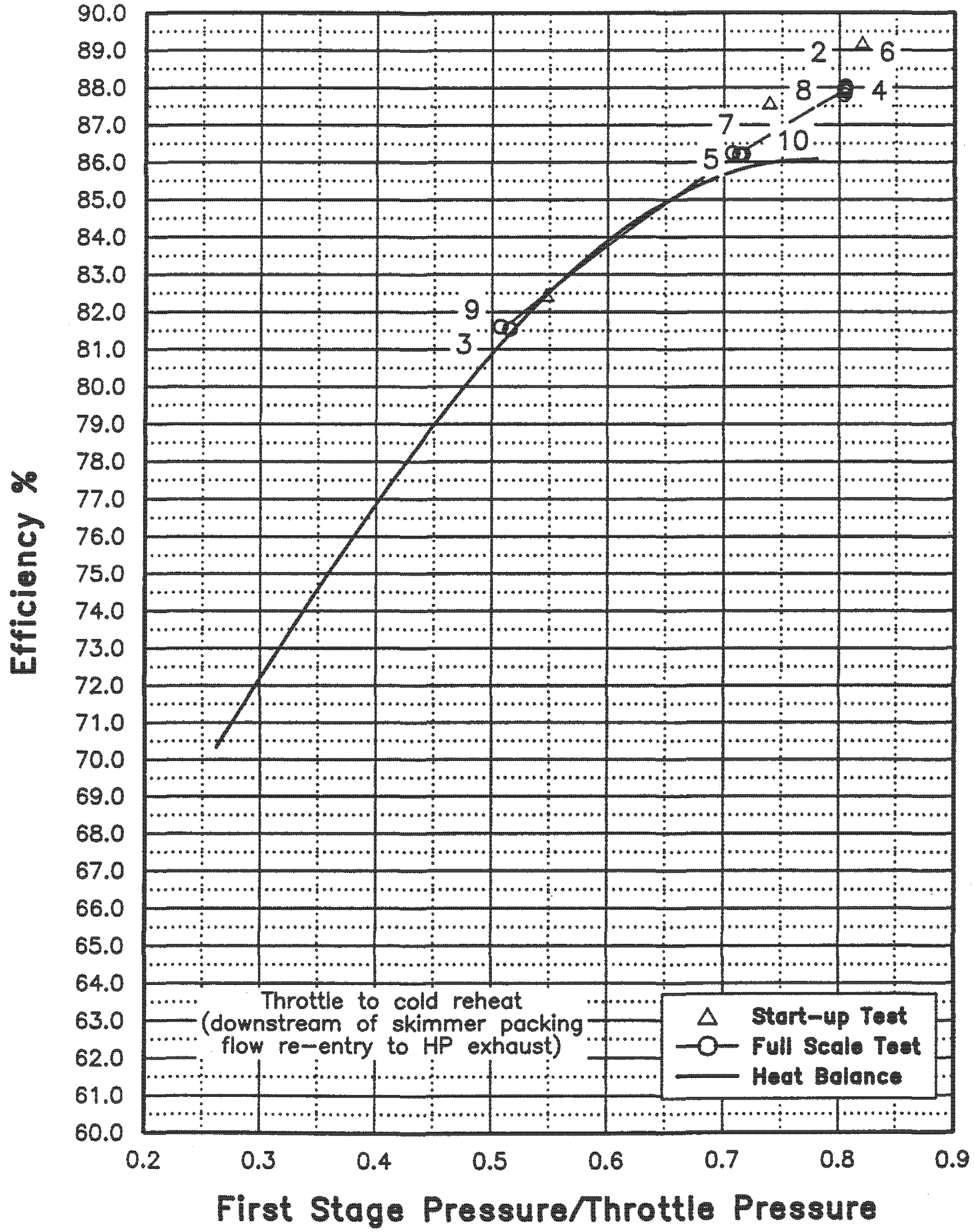


Figure 11

IP14_004860

INTERMOUNTAIN POWER CO.

Unit No. 2 T 151

Intermediate Pressure Section Efficiency

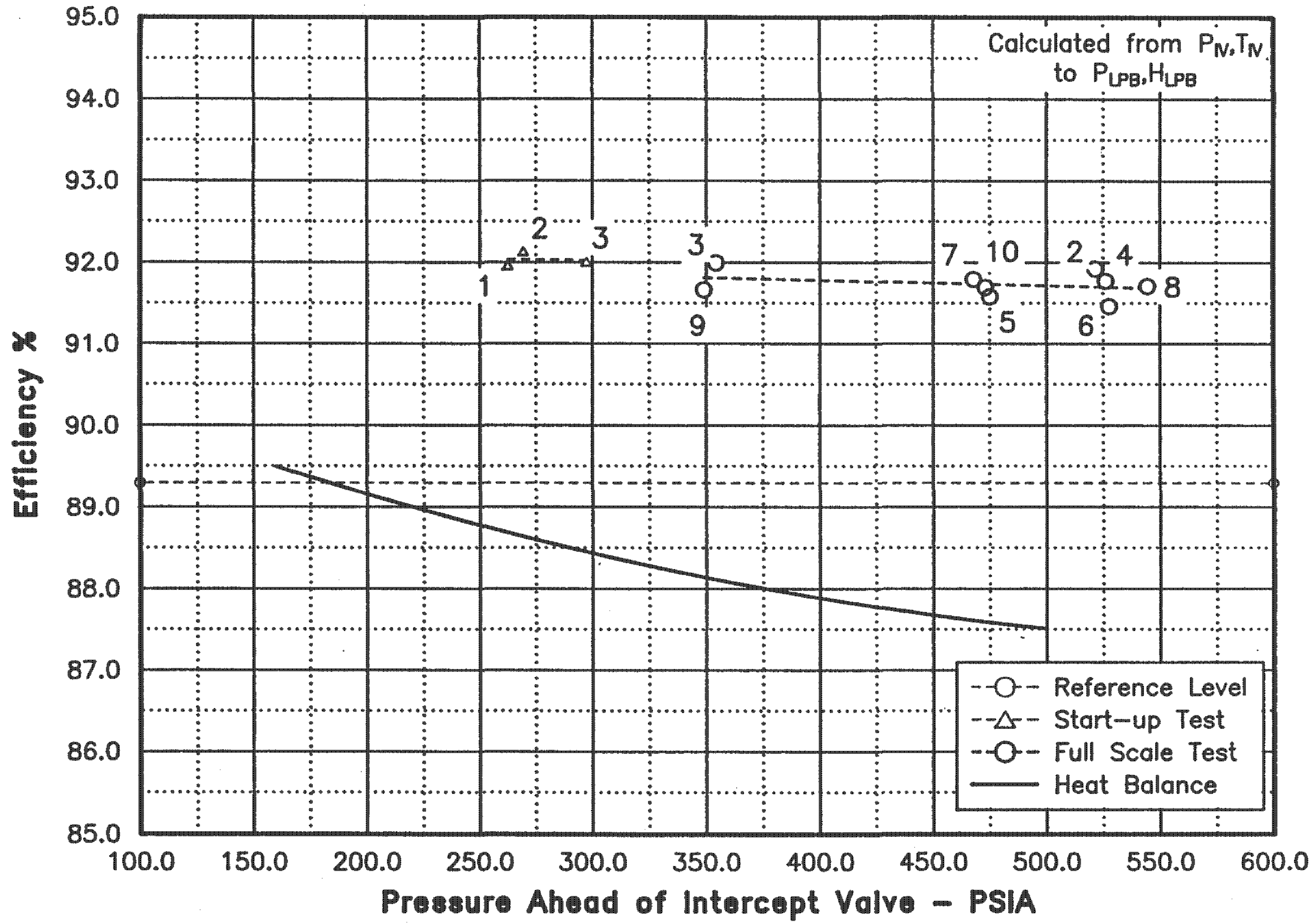


Fig. 12

IP14_004861

Figure 12

INTERMOUNTAIN POWER CO.

IPP No. 2

Reheat Steam Path Efficiency to UEEP

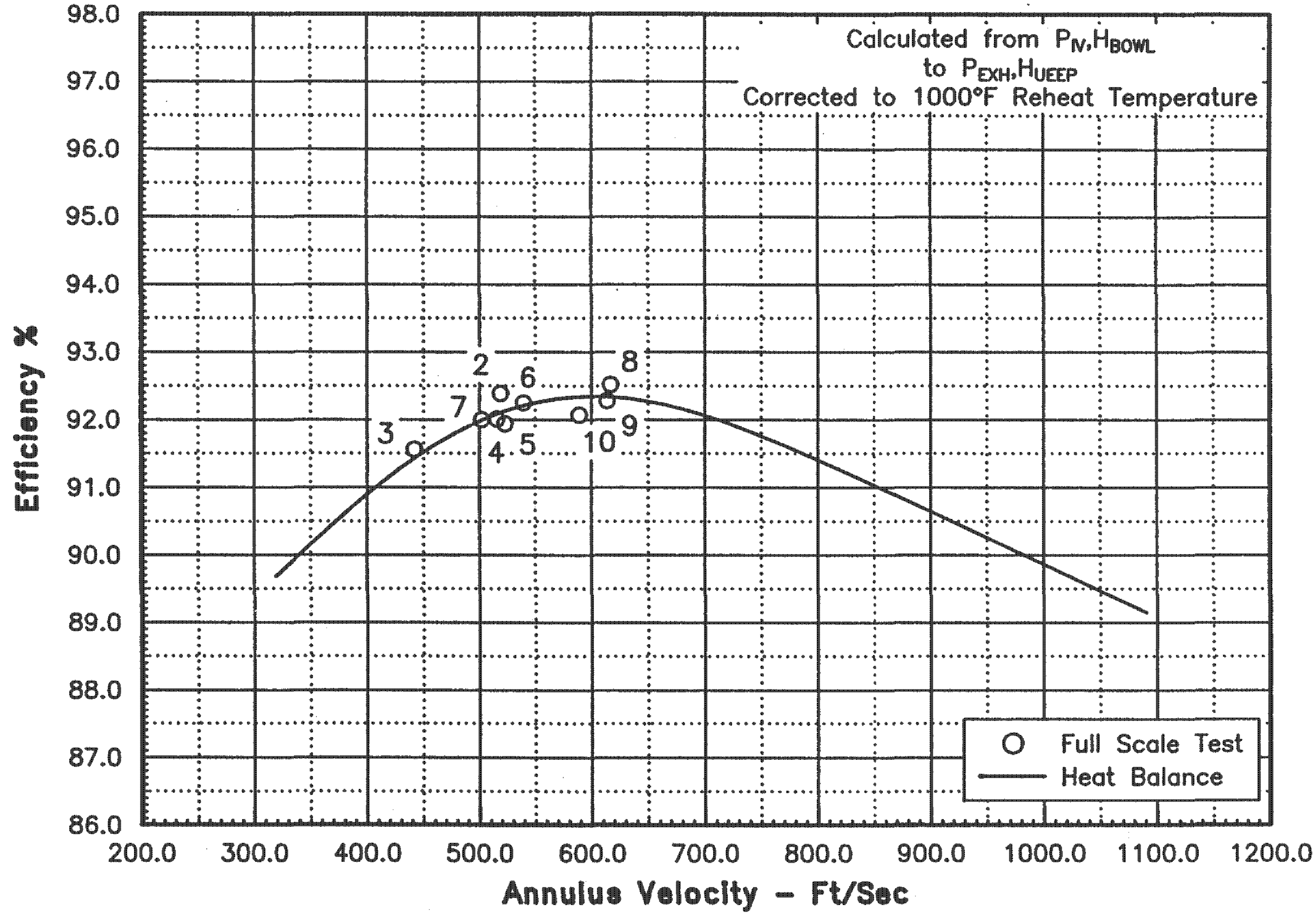


Fig. 13

Figure 13

INTERMOUNTAIN POWER CO.

IPP No. 2

Reheat Steam Path Efficiency to ELEP

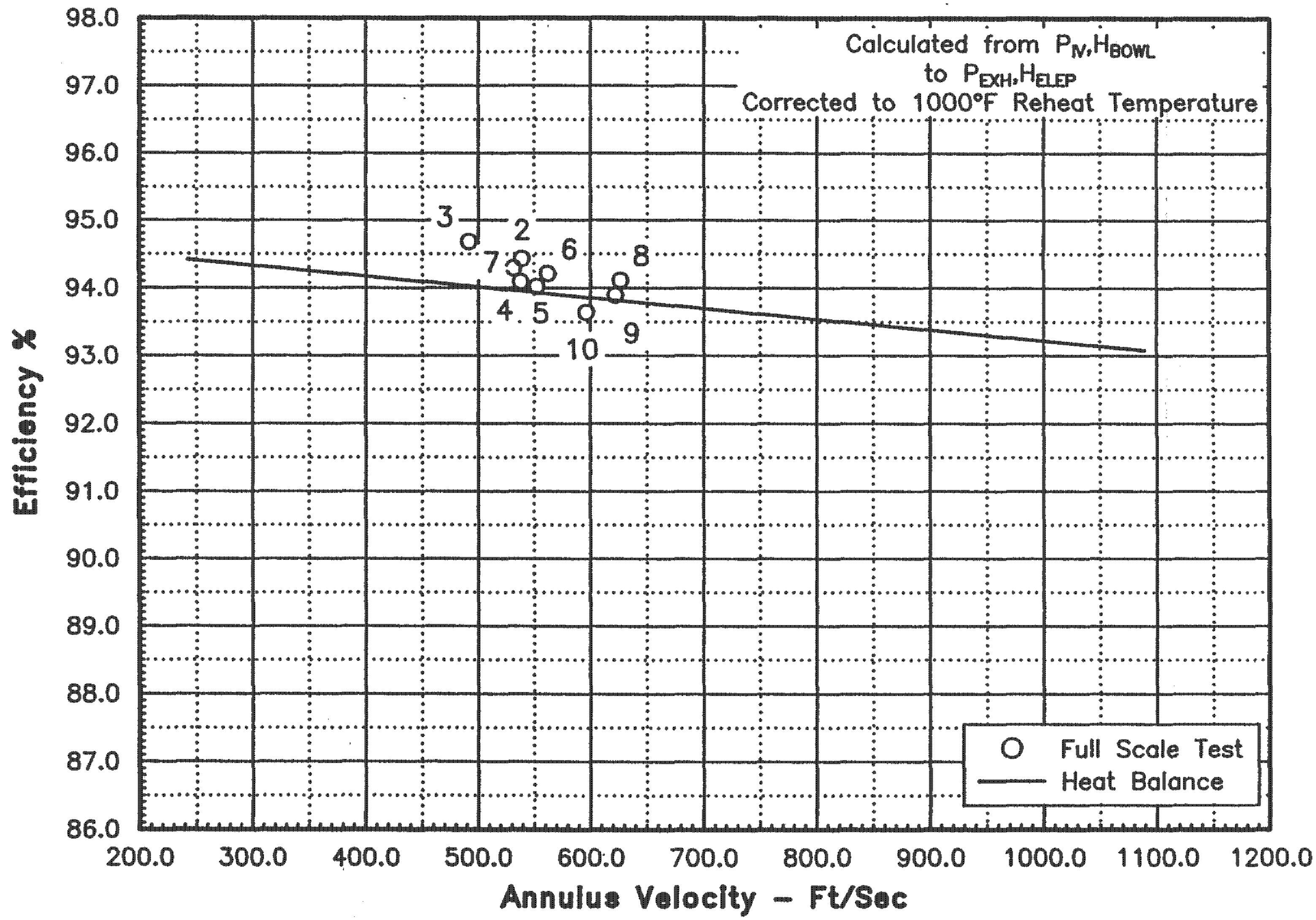


Figure 14

Fig. 14

IP14_004863

INTERMOUNTAIN POWER CO.

Unit No. 2 T 151

1st Stage Pressure

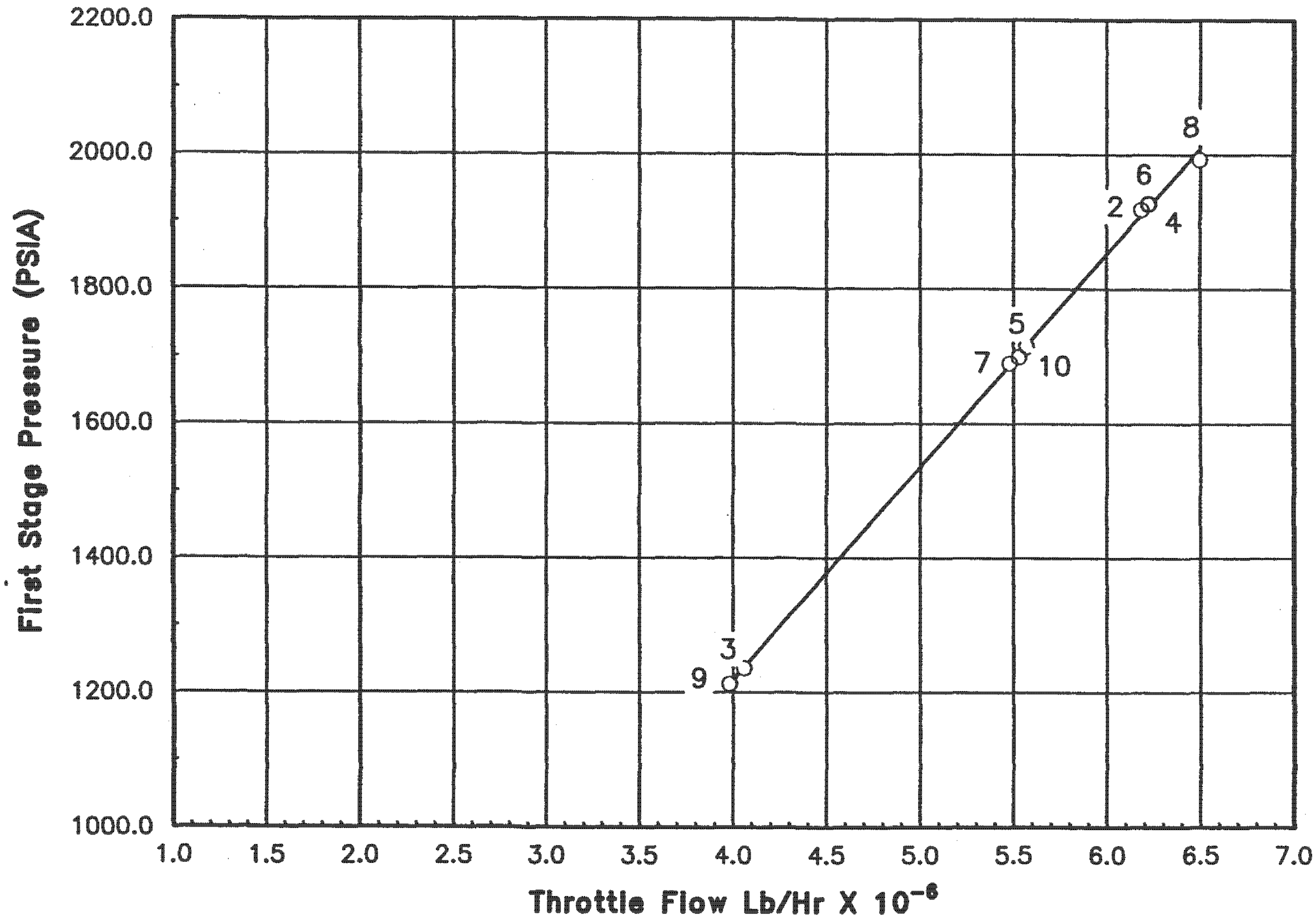


Fig. 18

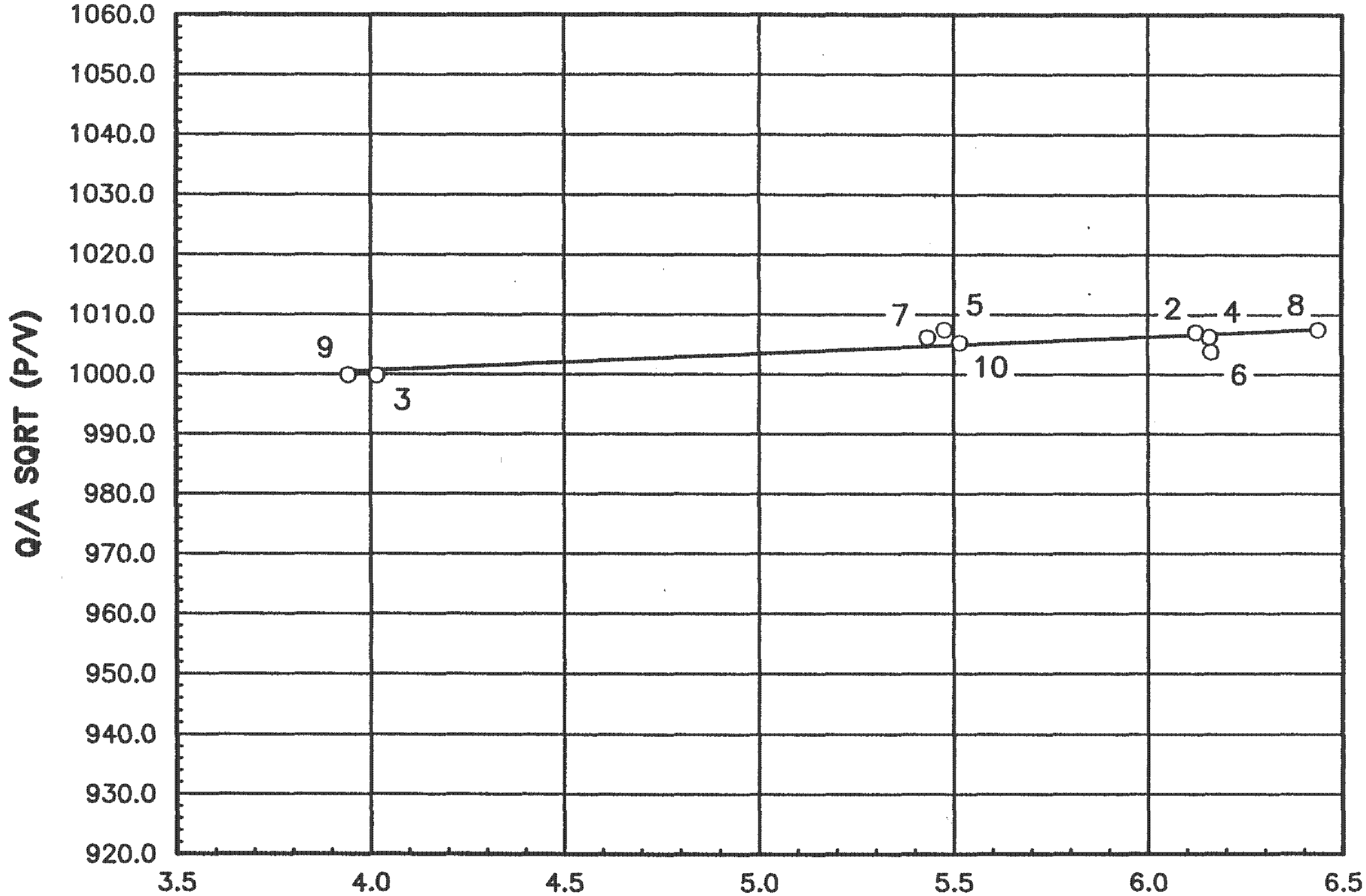
IP14_004864

Figure 18

INTERMOUNTAIN POWER CO.

IPP No. 2

First Stage Flow Function



Flow to the Following Stage (Lb/Hr) X 10^{-6}

Fig. 19

Figure 19

INTERMOUNTAIN POWER CO.

IPP No. 2

4th Stage Flow Function

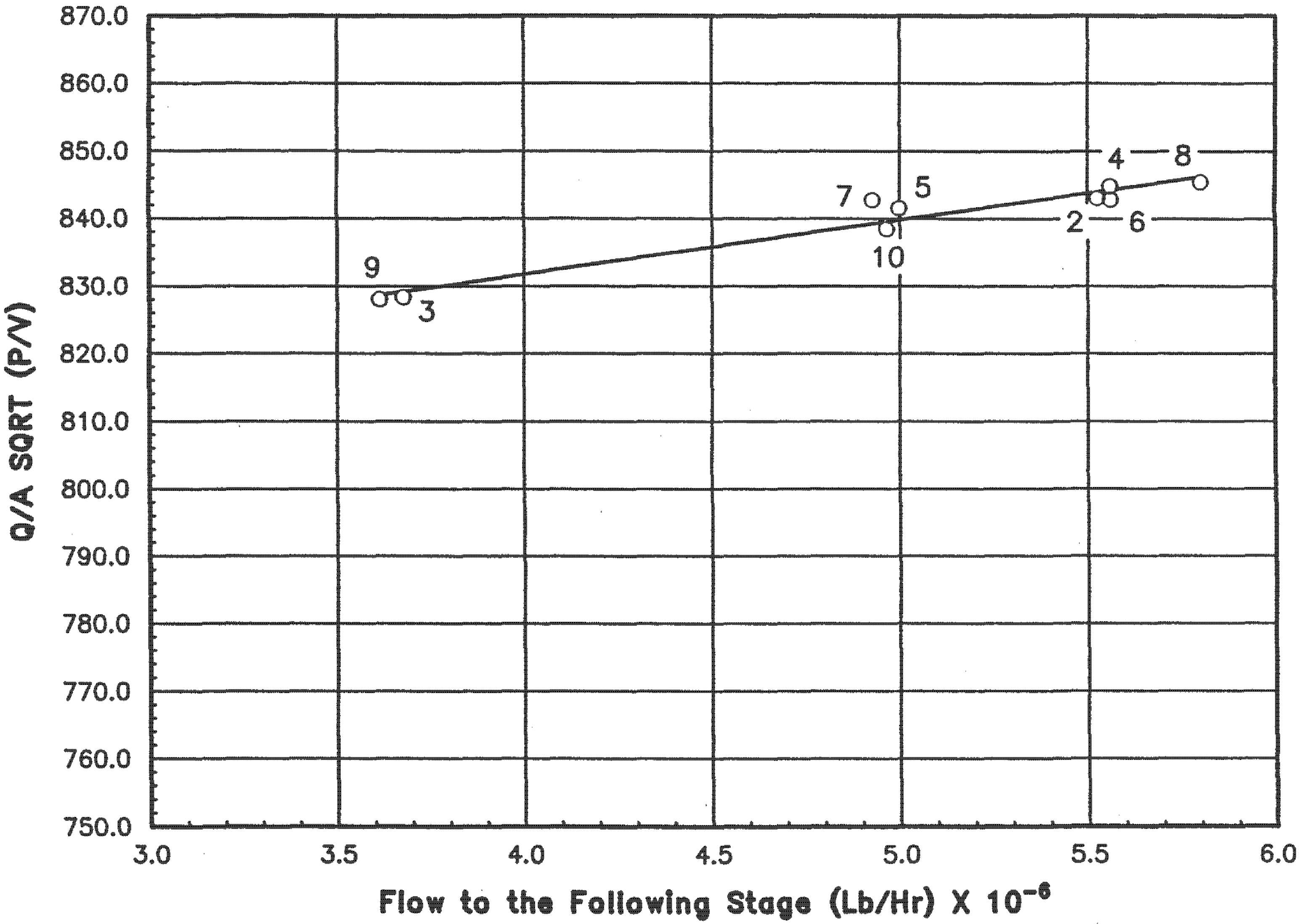


Figure 20

IP14_004866

Fig. 20

INTERMOUNTAIN POWER CO.

IPP No. 2

Hot Reheat Flow Function

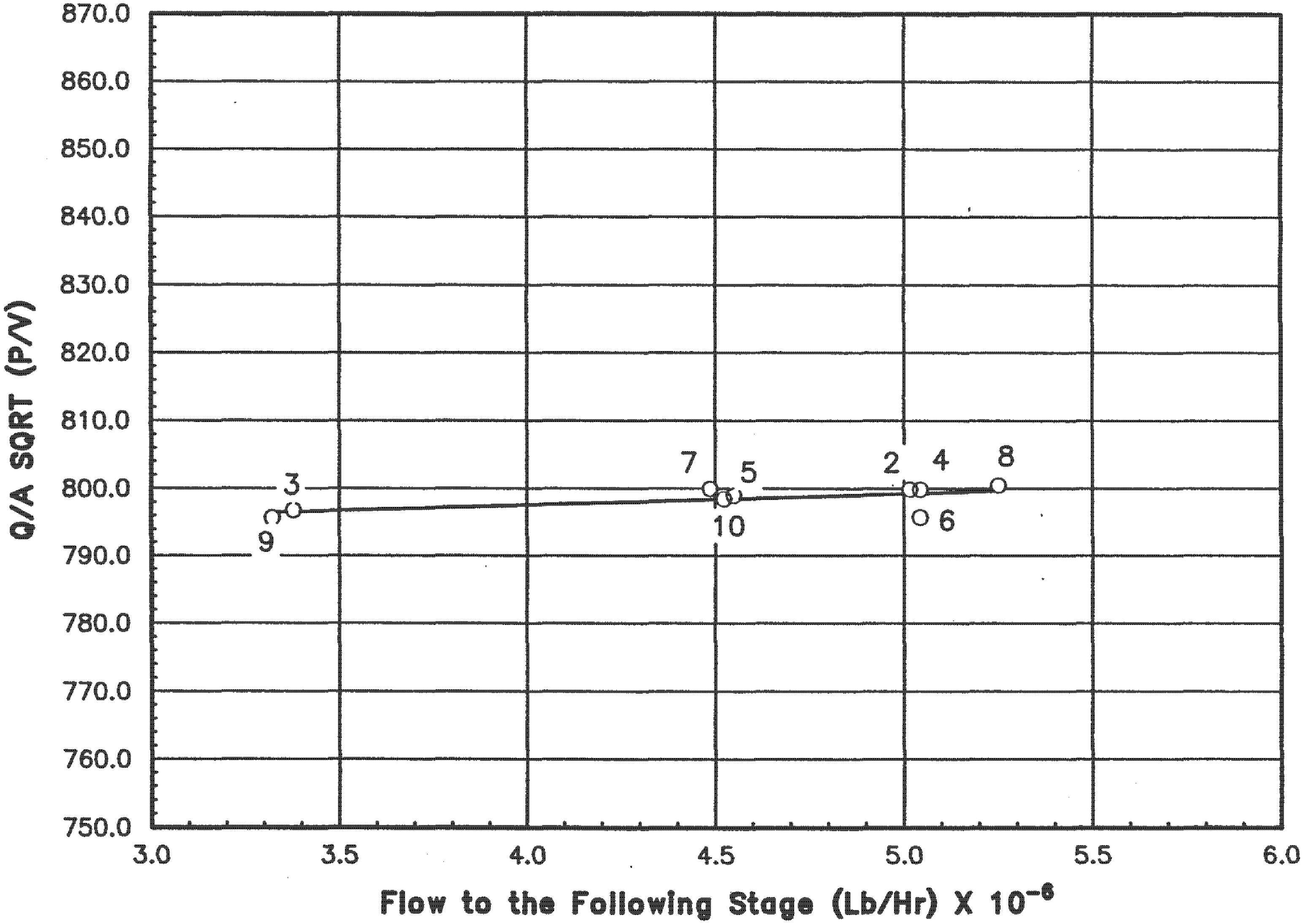


Figure 21

Fig. 21

INTERMOUNTAIN POWER CO.

IPP No. 2

Reheat Bowl Flow Function

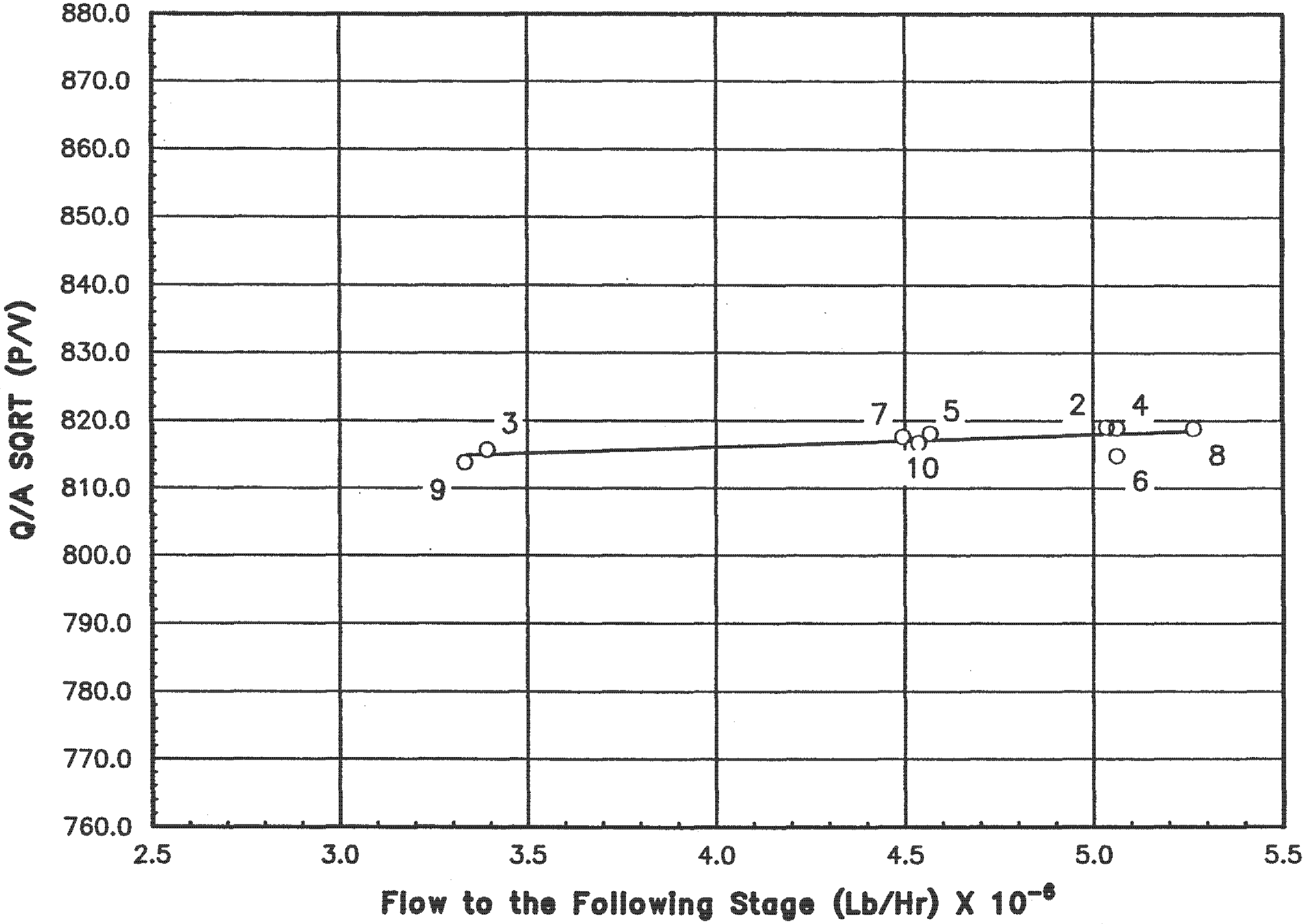


Fig. 22

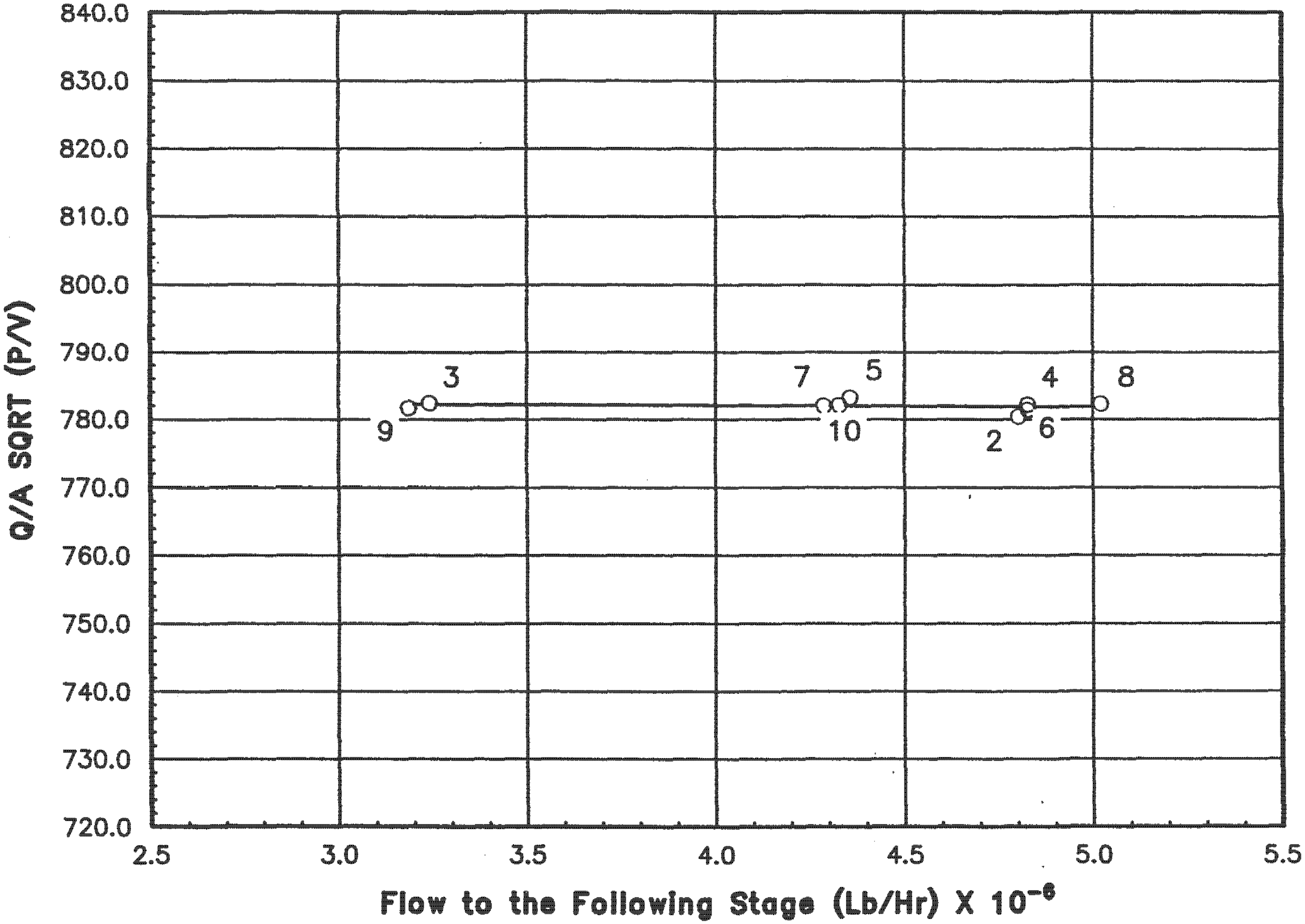
IP14_004868

Figure 22

INTERMOUNTAIN POWER CO.

IPP No. 2

11th Stage Flow Function



IP14_004869

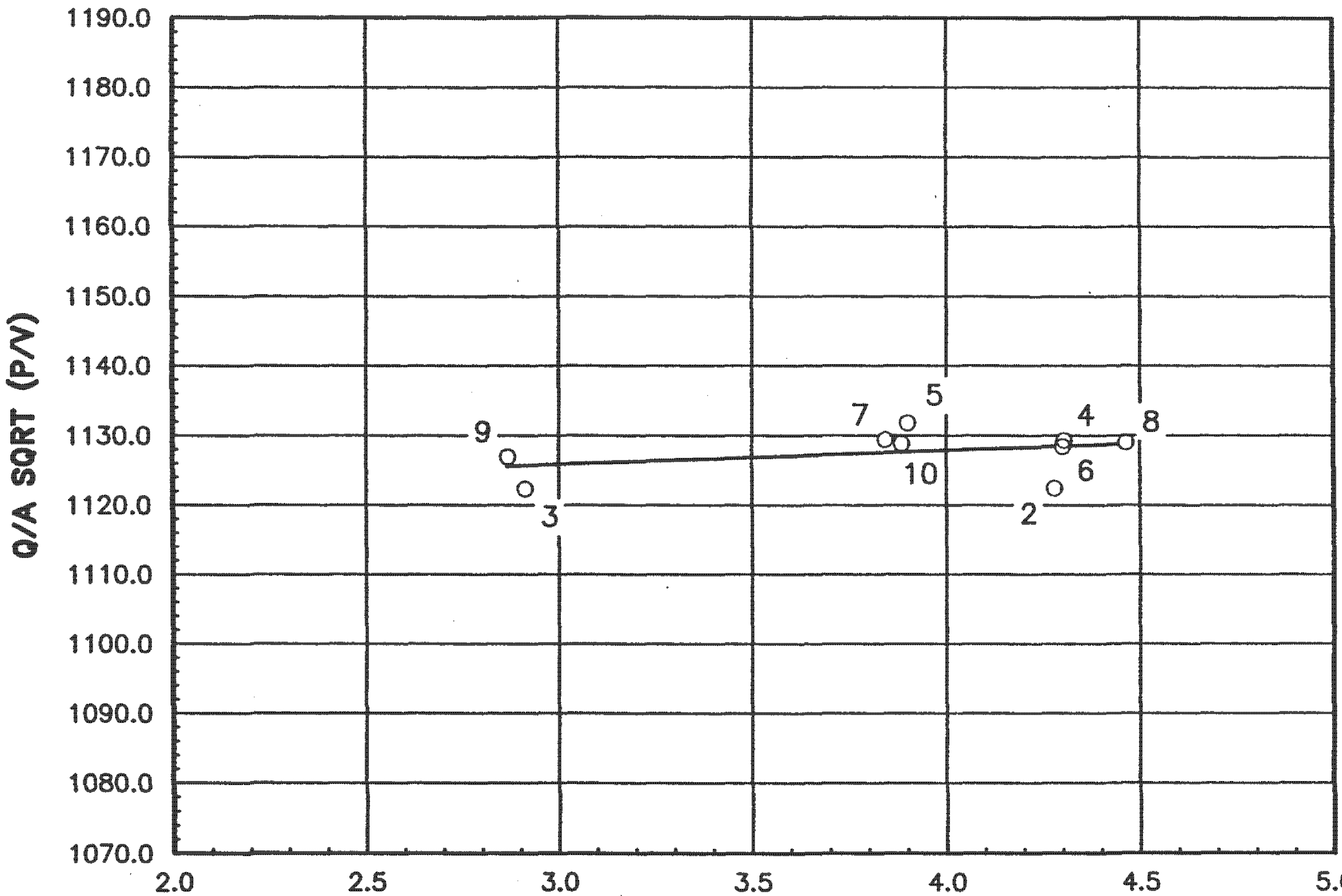
Fig. 23

Figure 23

INTERMOUNTAIN POWER CO.

IPP No. 2

Low Pressure Bowl Flow Function



Flow to the Following Stage (Lb/Hr) X 10^{-6}

IP14_004870

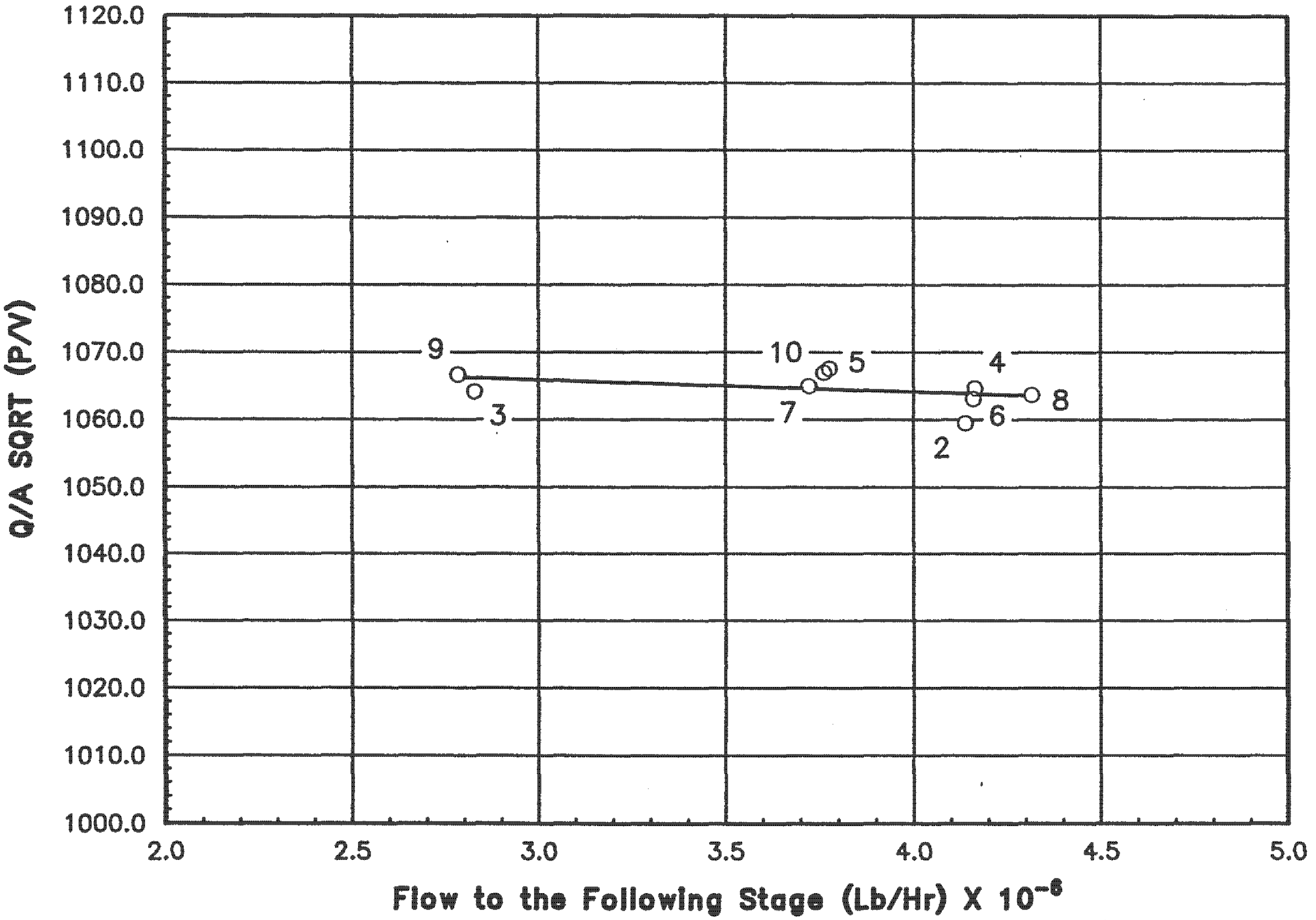
Fig. 24

Figure 24

INTERMOUNTAIN POWER CO.

IPP No. 2

15th Stage Flow Function



IP14_004871

Fig. 25

Figure 25

INTERMOUNTAIN POWER CO.

IPP No. 2

16th Stage Flow Function

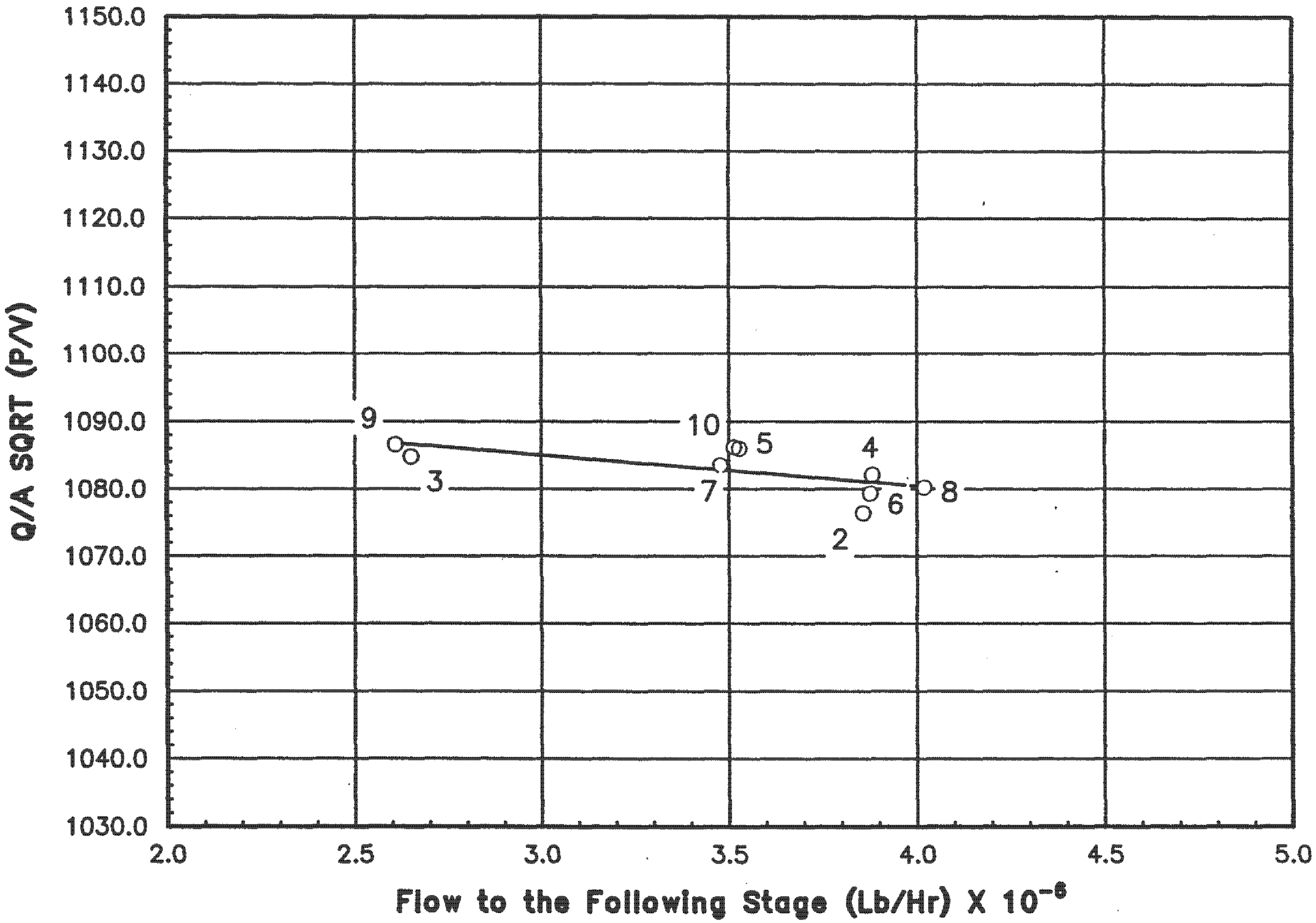


Fig. 26

Figure 26

IP14_004872

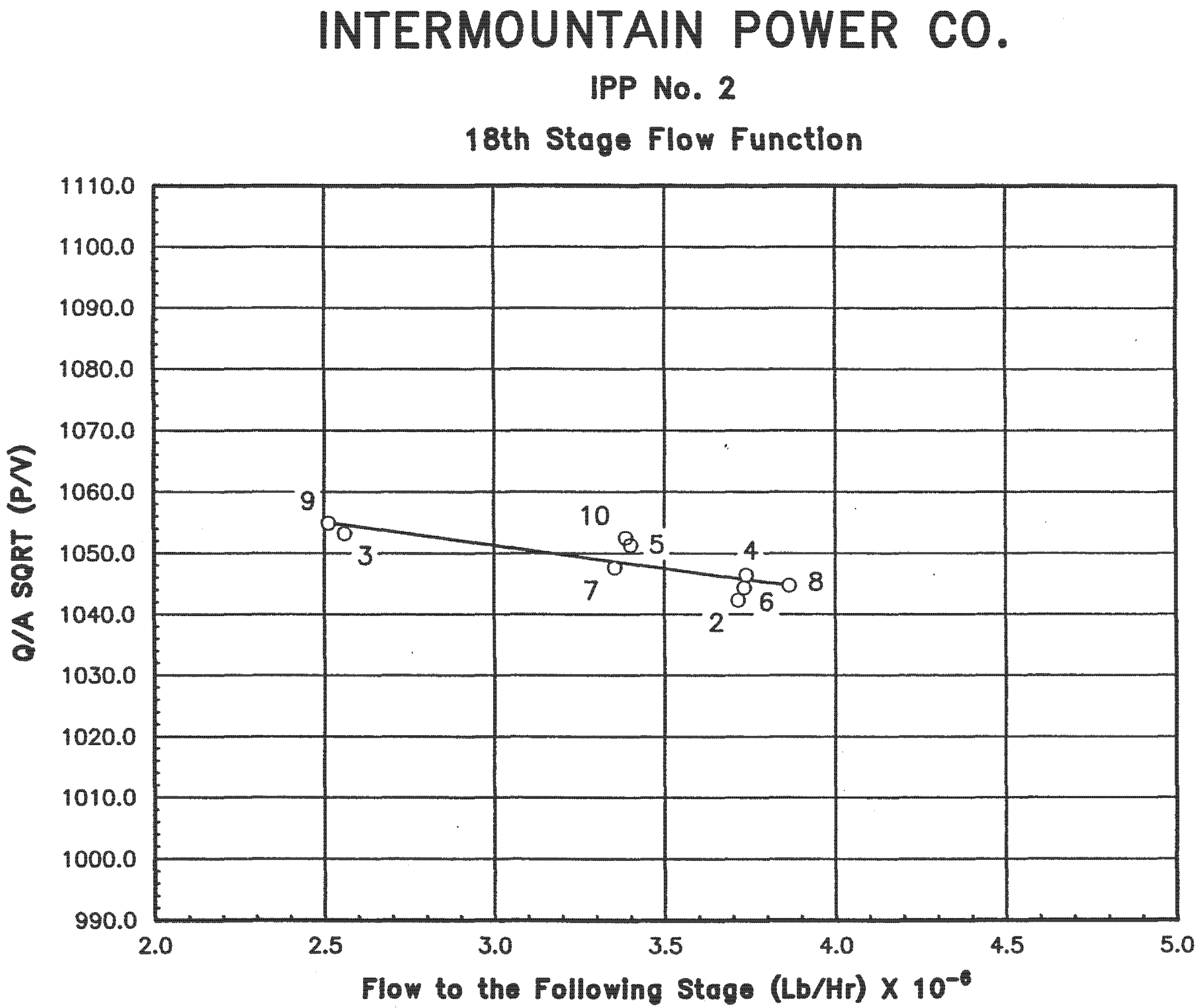


Fig. 27

IP14_004873

Figure 27

INTERMOUNTAIN POWER CO.

IPP No. 2

19th Stage Flow Function

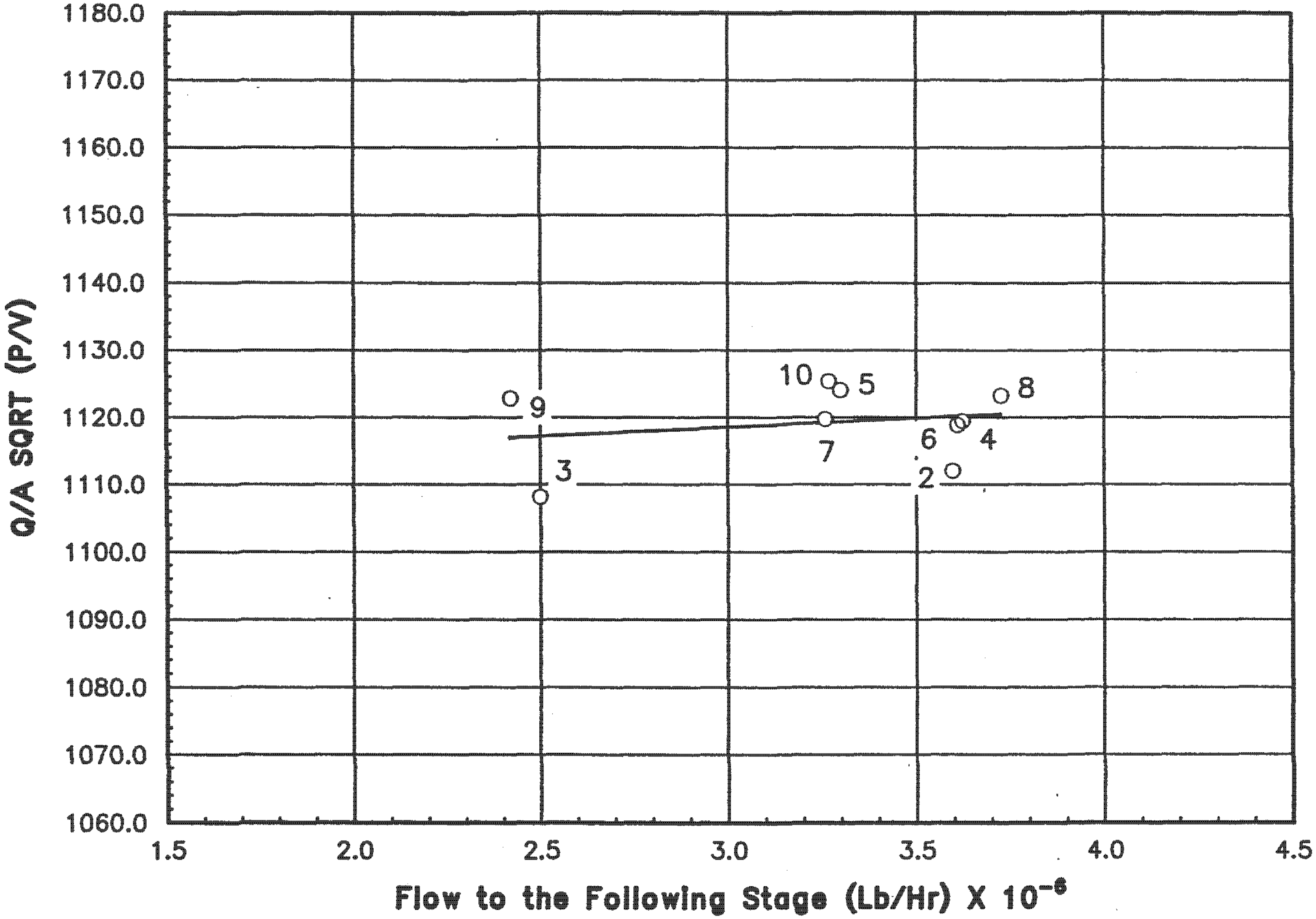


Fig. 28

IP14_004874

Figure 28

INTERMOUNTAIN POWER CO.

Unit No. 2 T 151

No. 1 Packing HPLO

Steam Seals
High Press Packing Leakoff

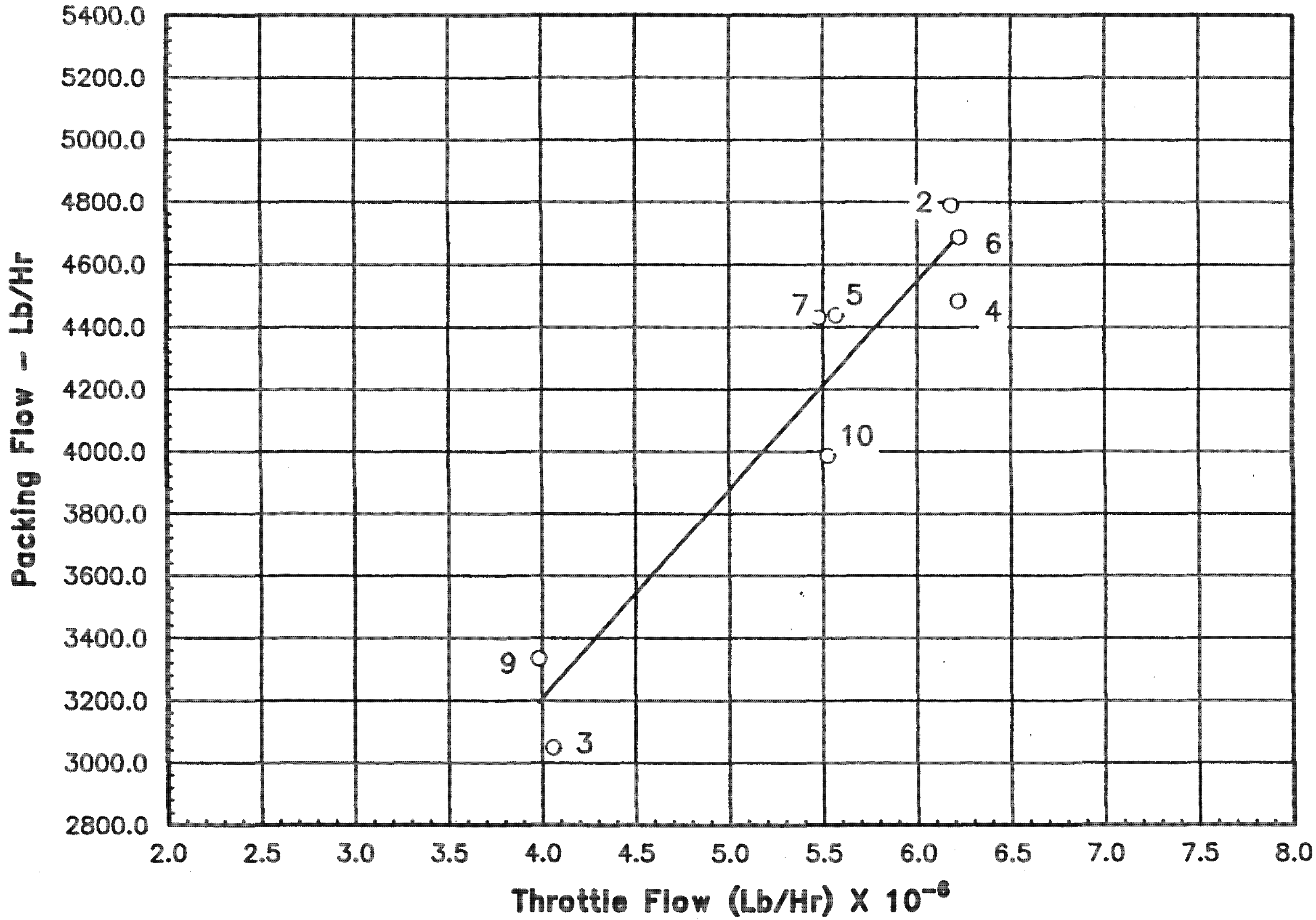


Fig. 29

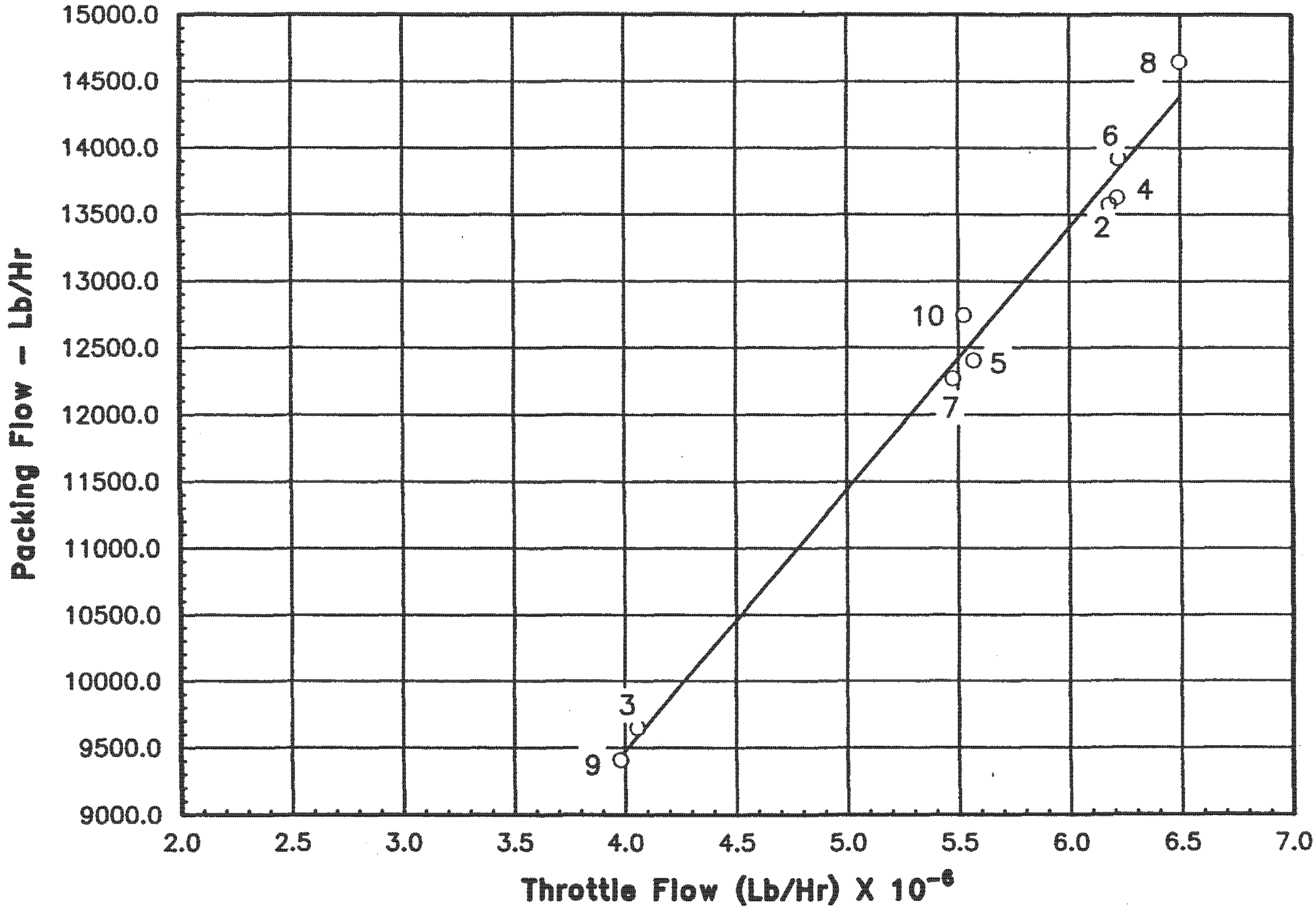
IP14_004875

Figure 29

INTERMOUNTAIN POWER CO.

Unit No. 2 T 151

No. 2 Packing HPLO



IP14_004876

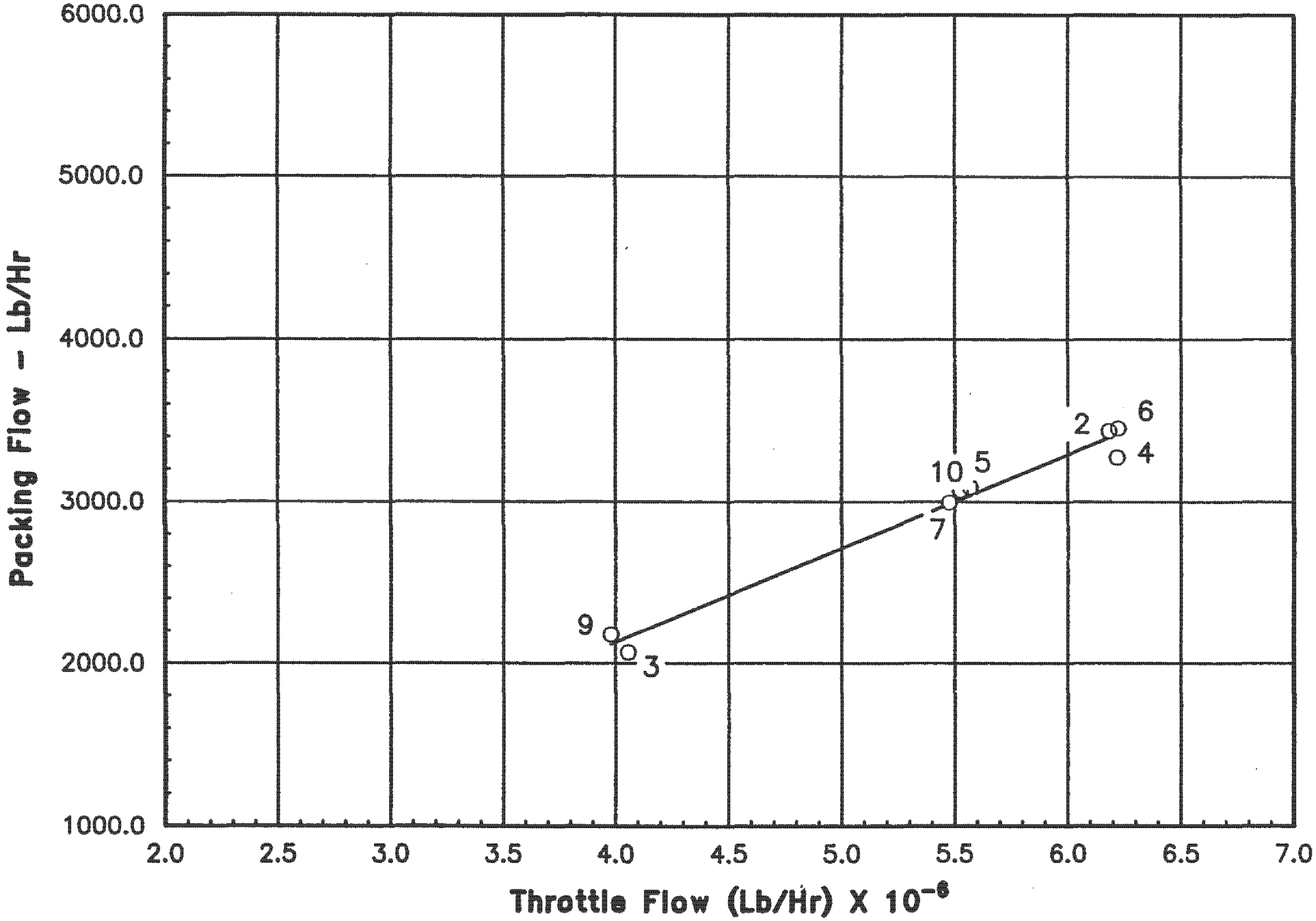
Fig. 30

Figure 30

INTERMOUNTAIN POWER CO.

Unit No. 2 T 151

No. 1 Packing LPLO



IP14_004877

Fig. 31

Figure 31

INTERMOUNTAIN POWER CO.

Unit No. 2 T 151

No. 2 Packing LPLO

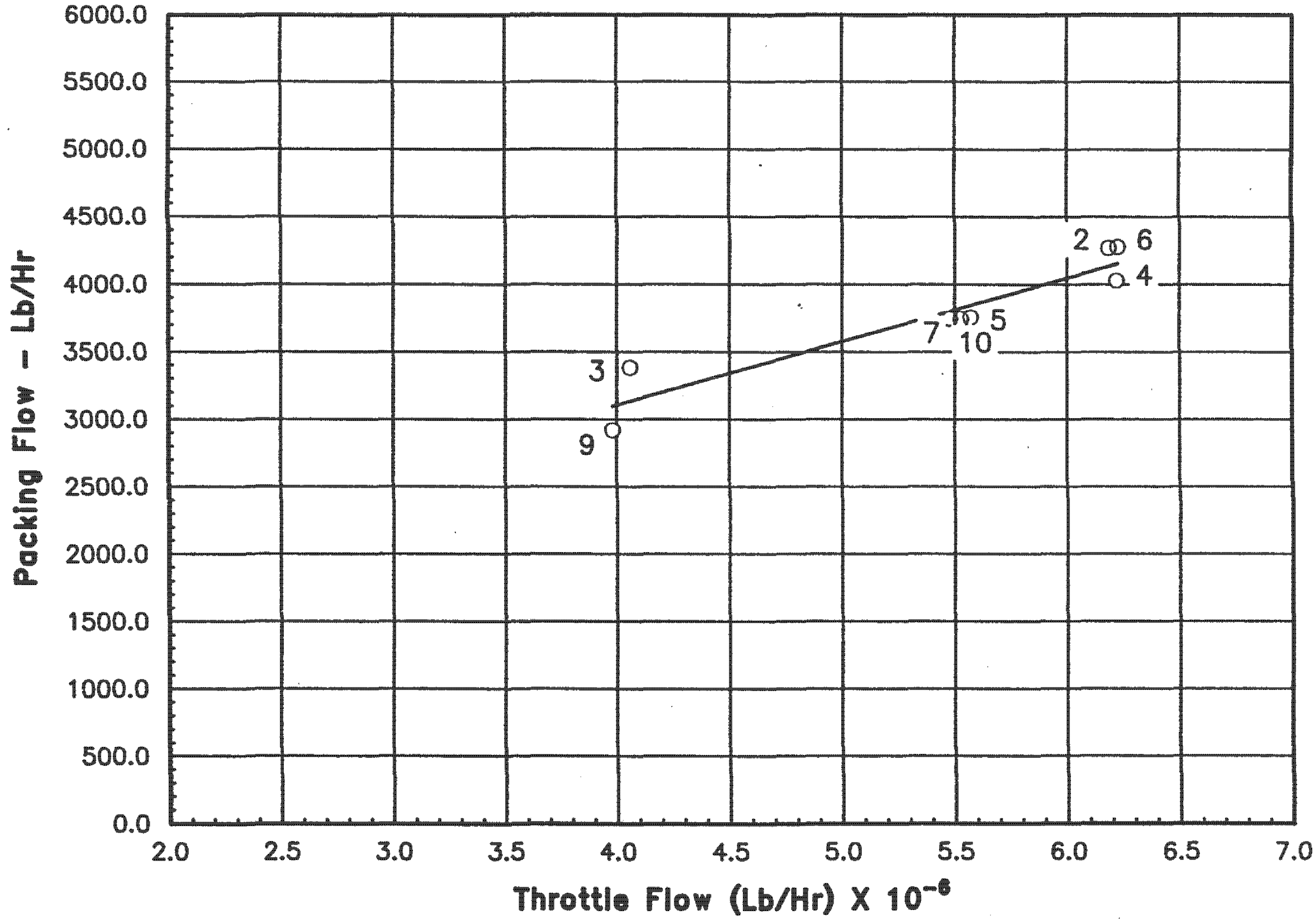


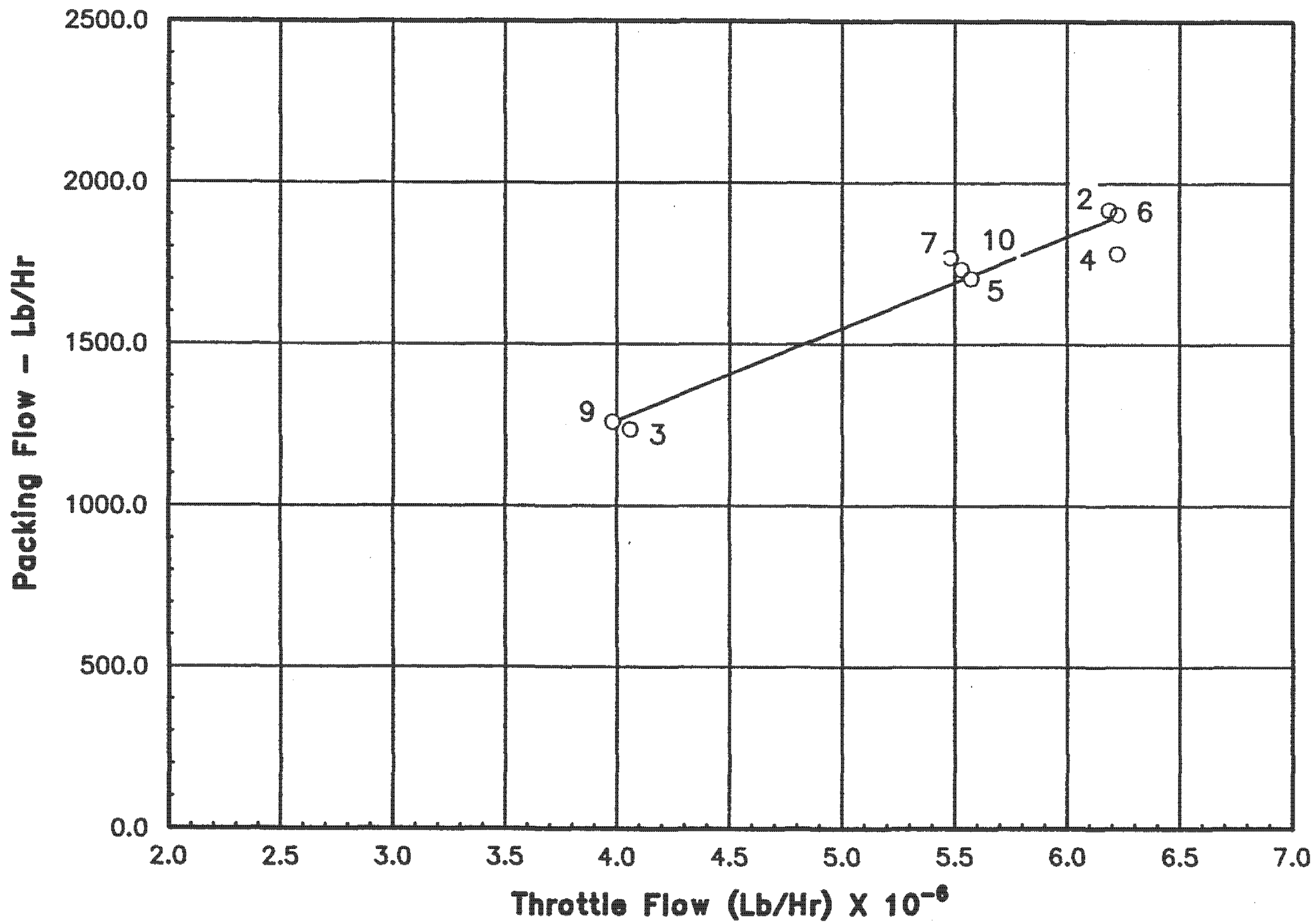
Fig. 32

Figure 32

INTERMOUNTAIN POWER CO.

Unit No. 2 T 151

No. 3 Packing LPLO



IP14_004879

Fig. 33

Figure 33

INTERMOUNTAIN POWER CO.

Unit No. 2 T 151

No. 4 Packing LPLO

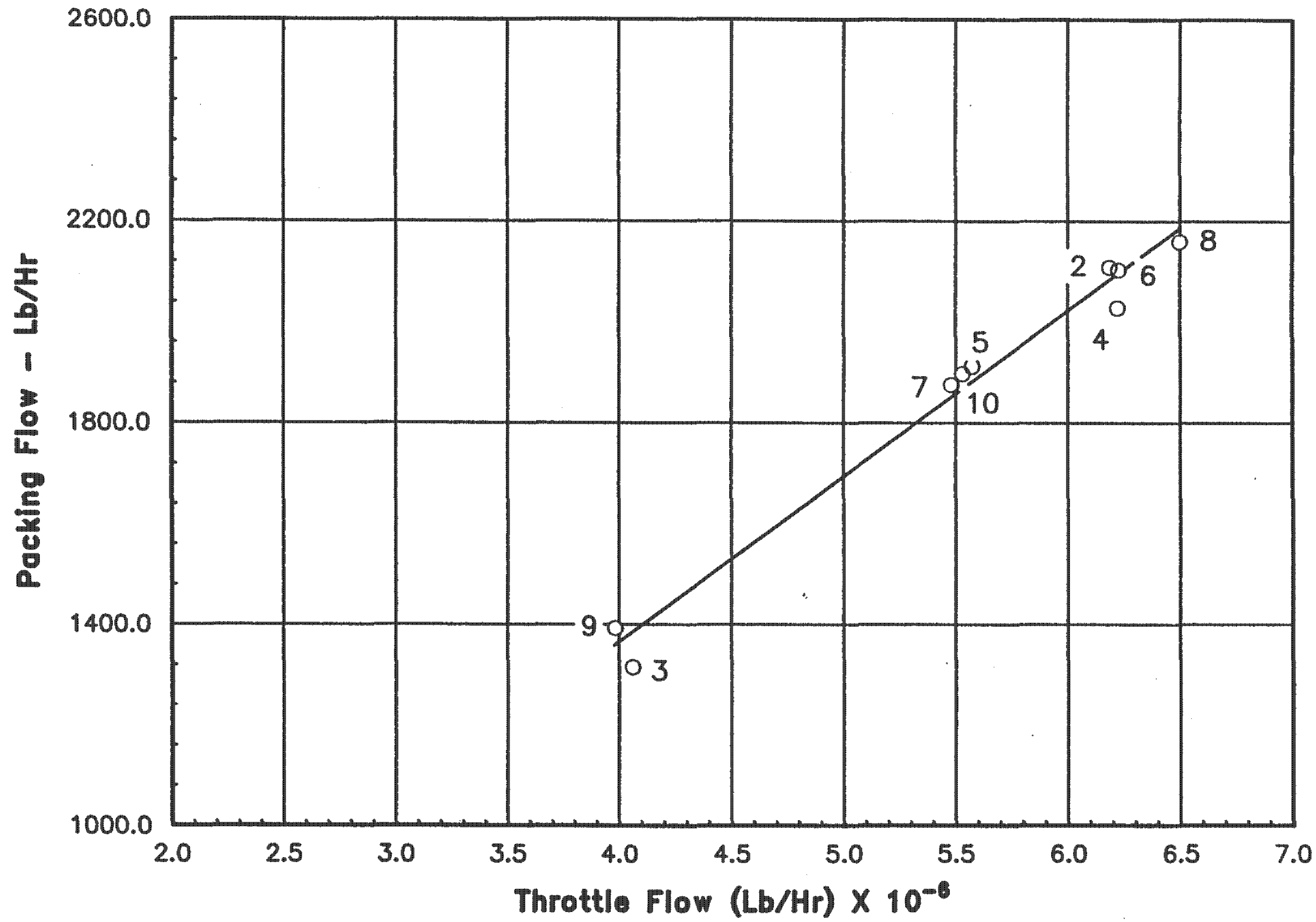
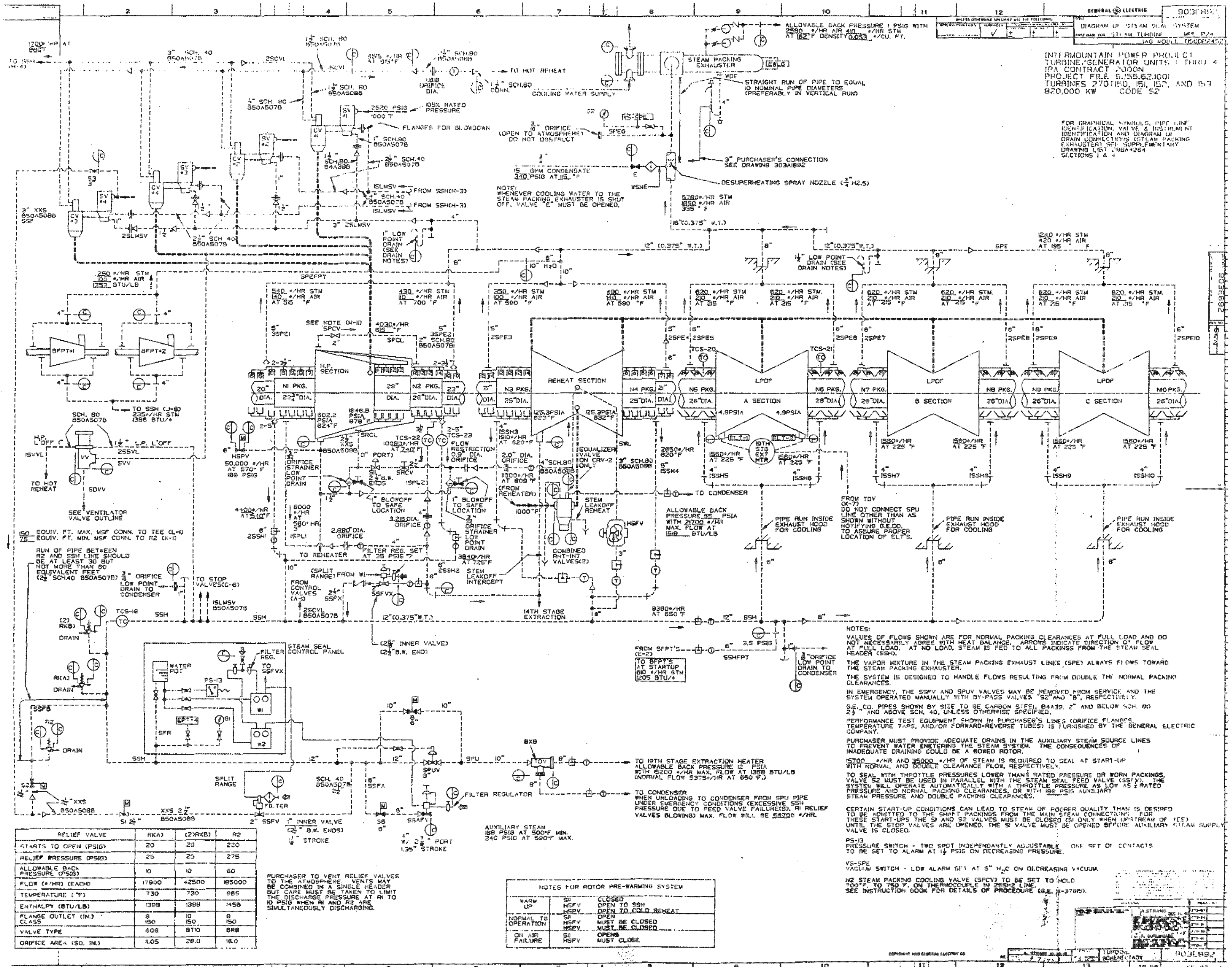


Figure 34

Fig. 34

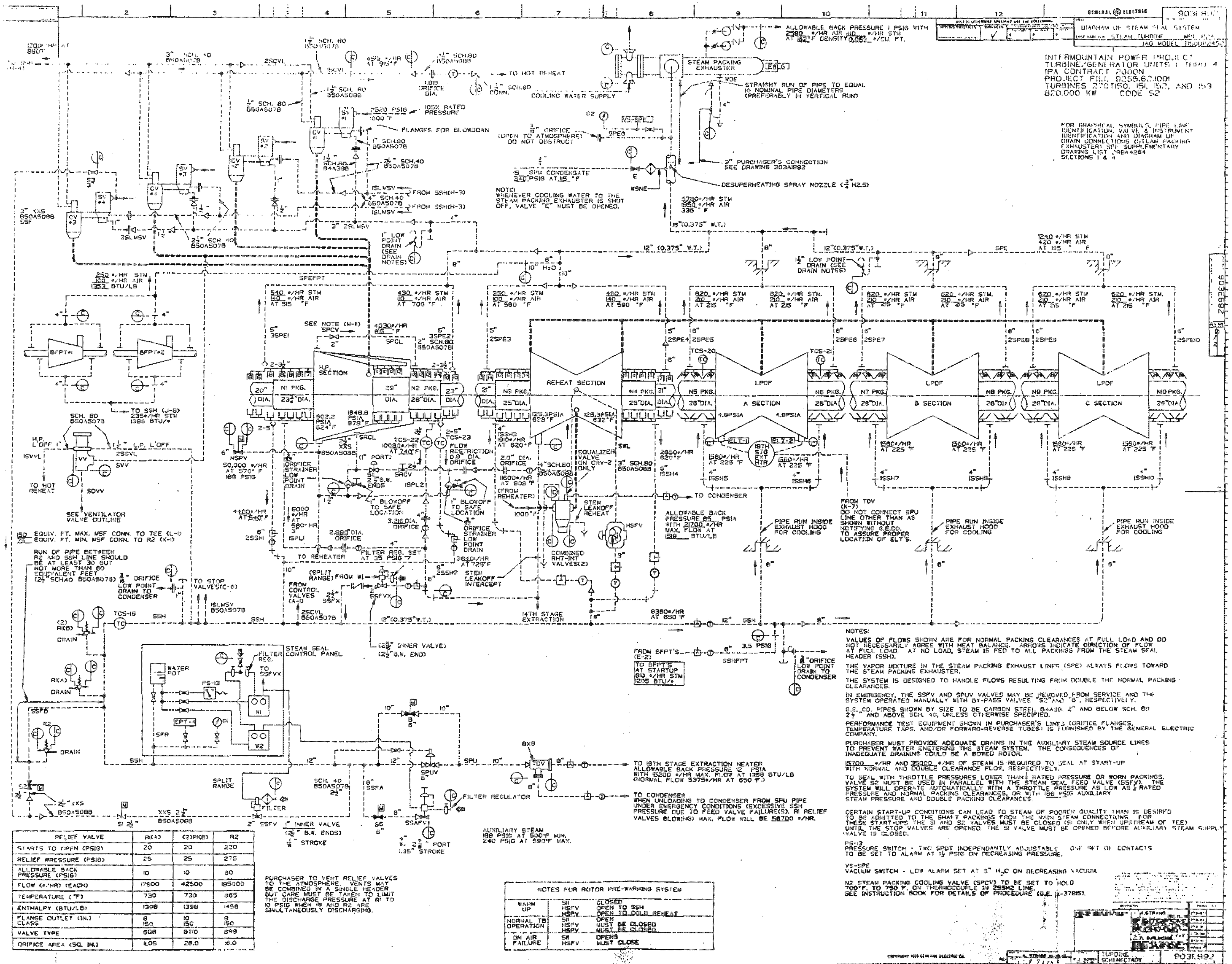


RELIEF VALVE	R1(A)	(2)R1(B)	R2
STARTS TO OPEN (PSIG)	20	20	220
RELIEF PRESSURE (PSIG)	25	25	275
ALLOWABLE BACK PRESSURE (PSIG)	10	10	80
FLOW (#/HR) (EACH)	17800	42500	185000
TEMPERATURE (°F)	730	730	865
ENTHALPY (BTU/LB)	1388	1388	1458
FLANGE OUTLET (IN.) CLASS	8 150	10 150	8 150
VALVE TYPE	6Q8	8T10	8R8
ORIFICE AREA (SQ. IN.)	11.05	28.0	16.0

NOTES FOR ROTOR PRE-WARMING SYSTEM		
WARM UP	S11	CLOSED
	HSFV	OPEN TO SSH
	HSPV	OPEN TO COLD REHEAT
NORMAL TB OPERATION	S11	OPEN
	HSFV	MUST BE CLOSED
	HSPV	MUST BE CLOSED
ON AIR FAILURE	S11	OPENS
	HSFV	MUST CLOSE

Steam Seal Flow Diagram

FIG. 4



RELIEF VALVE	R(A)	(2)R(B)	R2
STARTS TO OPEN (PSIG)	20	20	230
RELIEF PRESSURE (PSIG)	25	25	275
ALLOWABLE BACK PRESSURE (PSIG)	10	10	80
FLOW (#/HR) (EACH)	17900	42500	185000
TEMPERATURE (°F)	730	730	865
ENTHALPY (BTU/LB)	1398	1398	1458
FLANGE OUTLET (IN.) CLASS	8 150	10 150	8 150
VALVE TYPE	6Q8	8T10	6R8
ORIFICE AREA (SQ. IN.)	11.05	26.0	16.0

NOTES FOR ROTOR PRE-WARMING SYSTEM		
WARM UP	S11	CLOSED
	HSFV	OPEN TO SSH
	HSPV	OPEN TO COLD REHEAT
NORMAL TB OPERATION	S11	OPEN
	HSFV	MUST BE CLOSED
	HSPV	MUST BE CLOSED
ON AIR FAILURE	S11	OPENS
	HSFV	MUST CLOSE

FIG. 4

IP14_004882

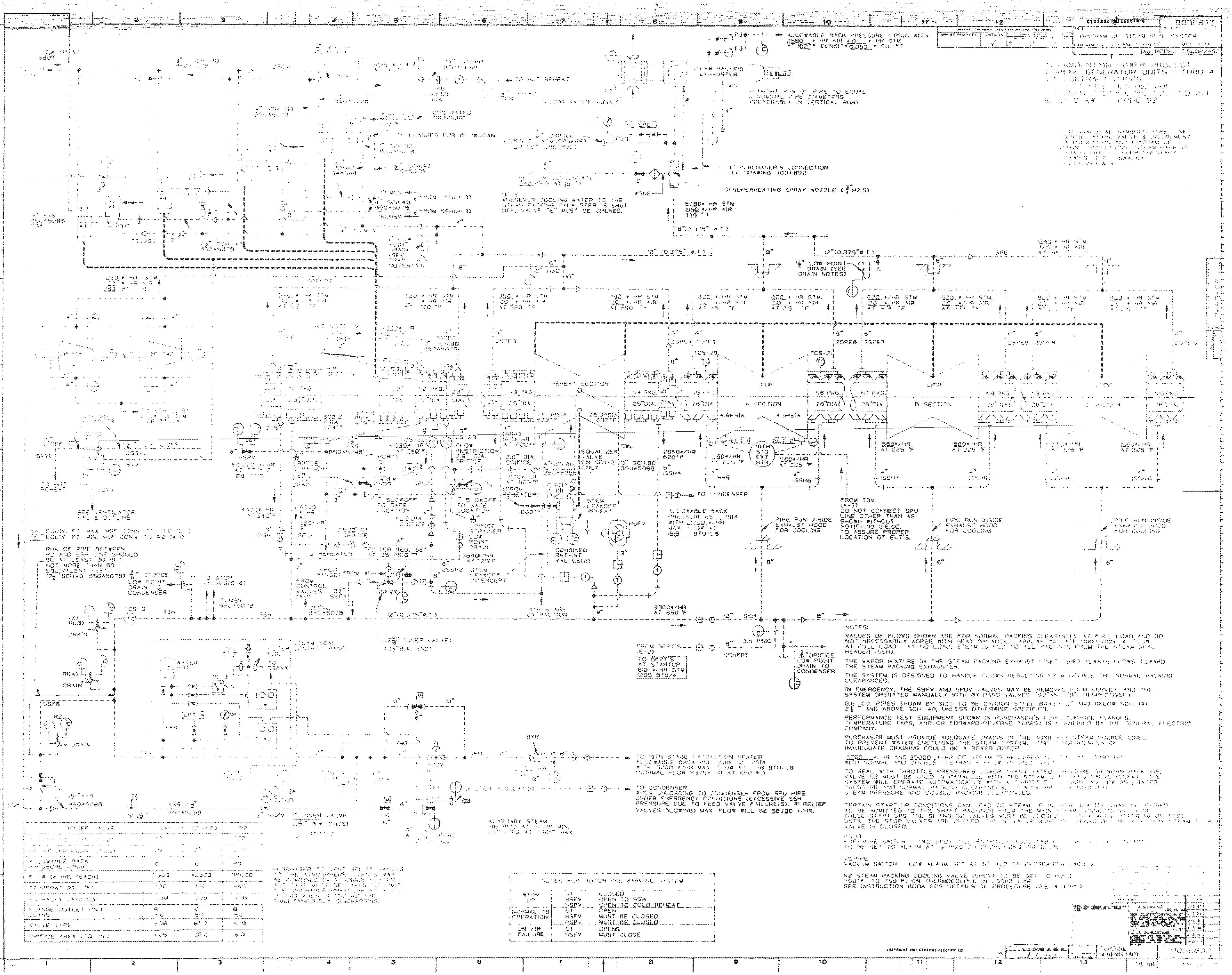
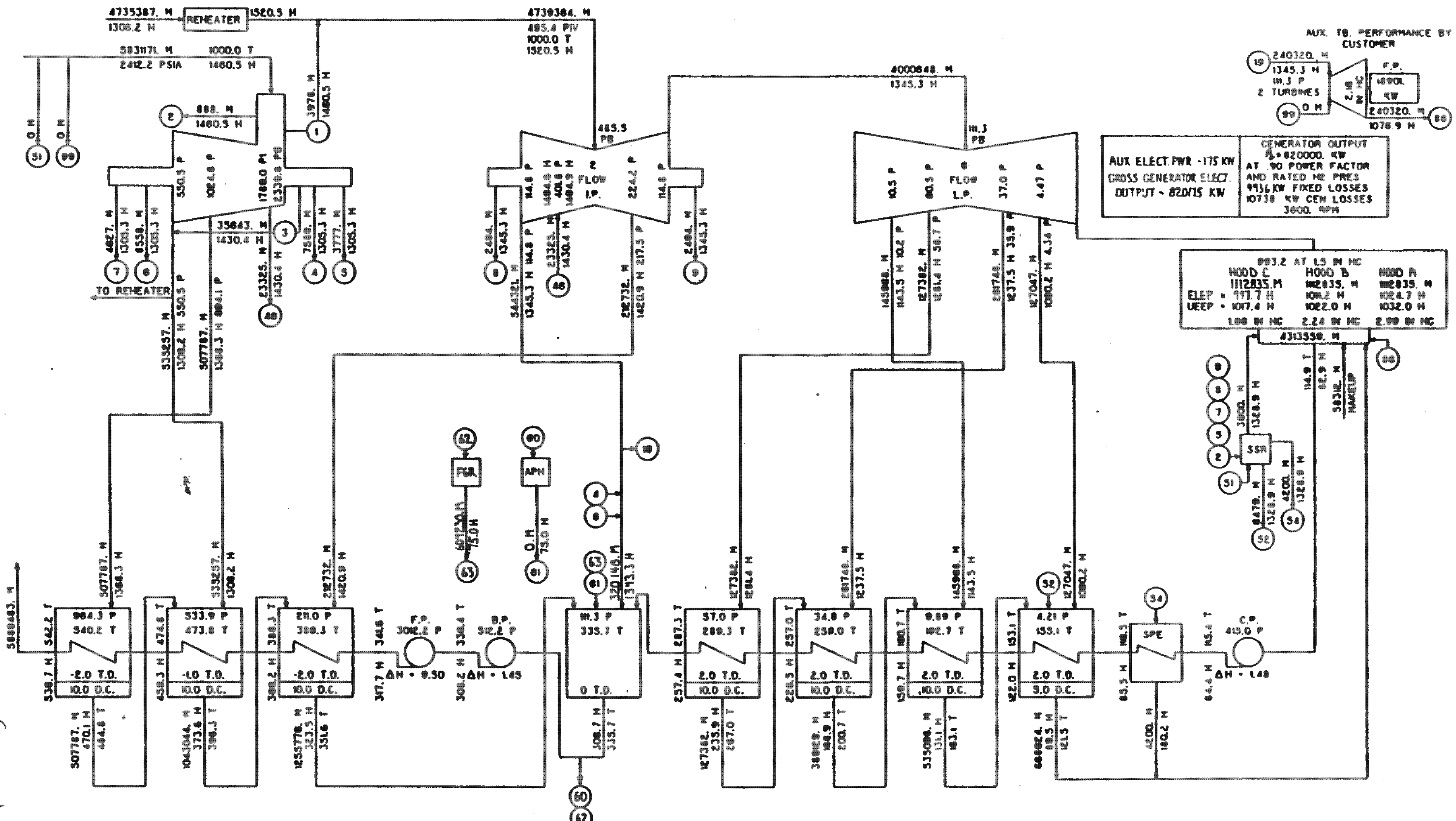


Fig. 4

IP14_004883

EXTRACTION ARRANGEMENT IS SCHEMATIC ONLY



CUSTOMER DEFINED VALVE BEST POINT NET HEAT RATE = $\frac{5831171.M(1460.5H-536.7H)+4735387.M(1520.5H-1306.2H)+4313559.M(1.48H)+5831.M(720.5H-536.7H)}{820000\ KW}$ = 7816 $\frac{Btu}{Kw\text{-}Hr}$

LEGEND - CALCULATIONS BASED ON 1967 ASME STEAM TABLES
M - FLOW-LB/HR
P - PRESSURE-PSIA
H - ENTHALPY-BTU/LB
T - TEMPERATURE-F DEGREES

820000. KW 1.66 / 2.24 / 2.99 IN HG ABS. 1.00 PCT MU
TC6F 30.0 IN. LSB 3600 RPM
2400 PSIG 1000. / 1000. F
GEN- 991000. KVA .90 PF LIQ

03ICF 1 DB0E91 9523 0 5
481 HB 111 8-24-81

GENERAL ELECTRIC COMPANY, SCHENECTADY N.Y.

Guarantee Heat Balance
Fig. 17A

Fig. 17A

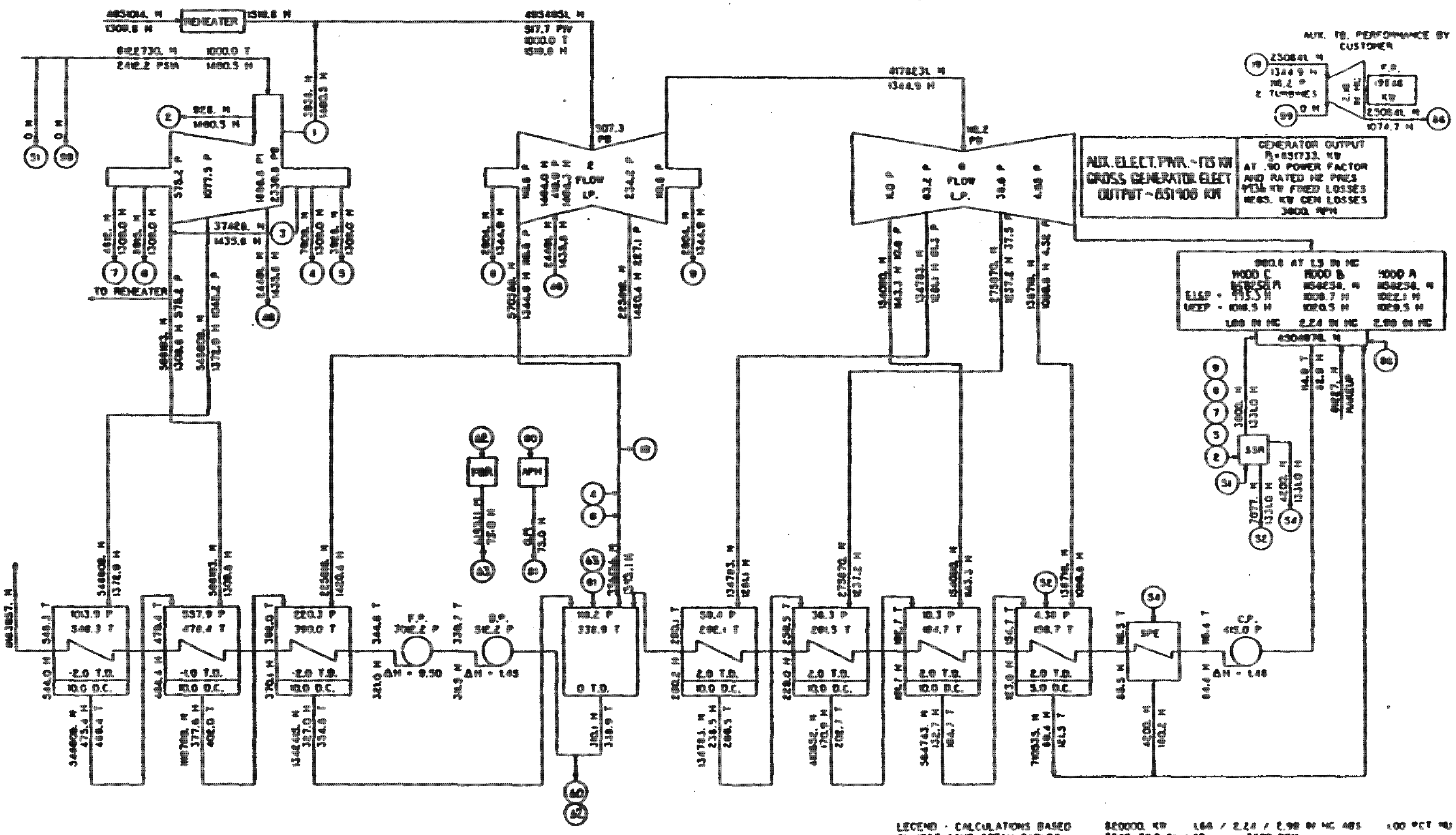
IP14_004884

481 HB 145

EXTRACTION ARRANGEMENT IS SCHEMATIC ONLY

CALCULATED DATA - NOT GUARANTEED

RATING FLOW IS 5831171. M AT INLET STEAM CONDITIONS OF 2412.2 PSIA AND 1000.0 T
TO ASSURE THAT THE TURBINE WILL PASS THIS FLOW, CONSIDERING VARIATIONS IN FLOW COEFFICIENTS
FROM EXPECTED VALUES, SHOP TOLERANCES ON DRAWING AREAS, ETC WHICH MAY AFFECT THE FLOW, THE
TURBINE IS BEING DESIGNED FOR A DESIGN FLOW RATING FLOW PLUS 5.0 PERCENT OF 6122730. M



CUSTOMER DEFINED
VALVE BEST POINT = 6122730.M(1460.5H-544.0H)+4951014.M(1519.8H-1309.8H)+4504976.M(1.48H)+6123.M(720.5H-544.0H) / 851733 KW = 7818 BTU/KW-HR
NET HEAT RATE

LEGEND - CALCULATIONS BASED ON 1967 ASME STEAM TABLES
M - FLOW-LB/HR
P - PRESSURE-PSIA
H - ENTHALPY-BTU/LB
T - TEMPERATURE-F DEGREES

820000. KW 1.68 / 2.24 / 2.98 IN HG ABS 100 PCT MU
TC6F 30.0 IN LSB 3600 RPM
2400 PSIG 1000 / 1000 F
GEN- 911000 KVA 90 PF LIO

KW Koran

534AT 1 DBOE91 0 G 8 7-17-81
481 HB 145

GENERAL ELECTRIC COMPANY, SCHENECTADY N.Y.

Fig. 17B

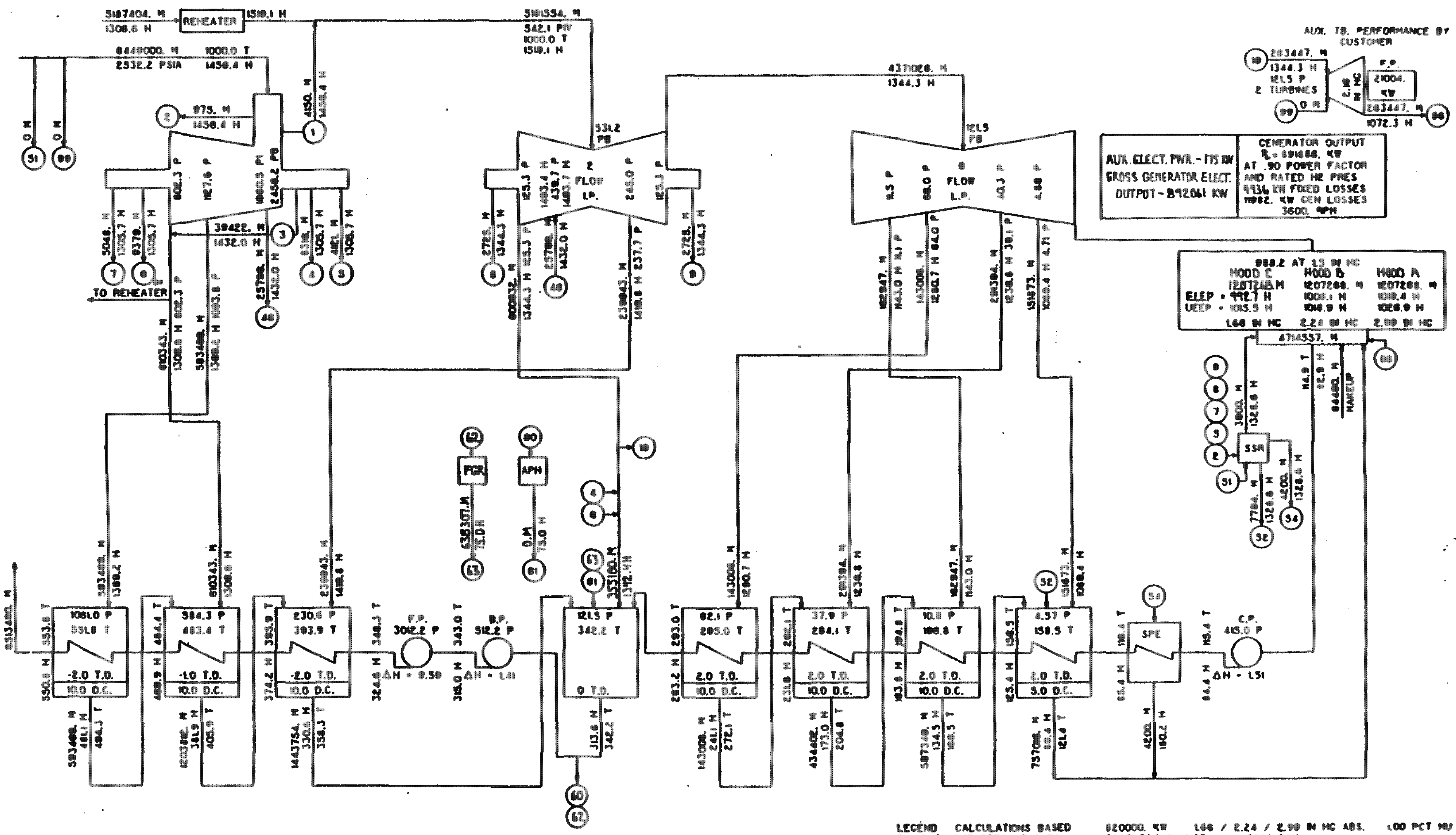
VWO HB
Fig. 17B

481 HB 112

EXTRACTION ARRANGEMENT IS SCHEMATIC ONLY

CALCULATED DATA · NOT GUARANTEED

RATING FLOW IS 5831176. M AT INLET STEAM CONDITIONS OF 2412.2 PSIA AND 1000.0 T TO ASSURE THAT THE TURBINE WILL PASS THIS FLOW, CONSIDERING VARIATIONS IN FLOW COEFFICIENTS FROM EXPECTED VALUES, SHOP TOLERANCES ON DRAWING AREAS, ETC. WHICH MAY AFFECT THE FLOW, THE TURBINE IS BEING DESIGNED FOR A DESIGN FLOW (RATING FLOW PLUS 5.0 PERCENT) OF 6122730. M THE EQUIVALENT DESIGN FLOW AT 2532.2 PSIA AND 1000.0 T IS 6449000. M .



CUSTOMER DEFINED
VALVE BEST POINT
NET HEAT RATE = $\frac{6449000.M(1456.4H-550.8H)+5187404.M(1519.1H-1306.6H)+4714557.M(1.51H)+6449.M(720.5H-550.8H)}{891886\ KW}$ = 7793 $\frac{Btu}{Kw\text{-}Hr}$

LEGEND CALCULATIONS BASED ON 1967 ASME STEAM TABLES
M · FLOW-LB/HR
P · PRESSURE-PSIA
H · ENTHALPY-BTU/LB
T · TEMPERATURE-F DEGREES

820000. KW 1.66 / 2.24 / 2.90 IN HC ABS. 1.00 PCT MU
TC6F 30.0 IN. LSB 3600 RPM
2400 PSIG 1000. / 1000. T
GEN- 991000. KVA .90 PF L10

Fig. 17C

031C1 1 D80281 0 0 12
481 HB 112
6-24-81

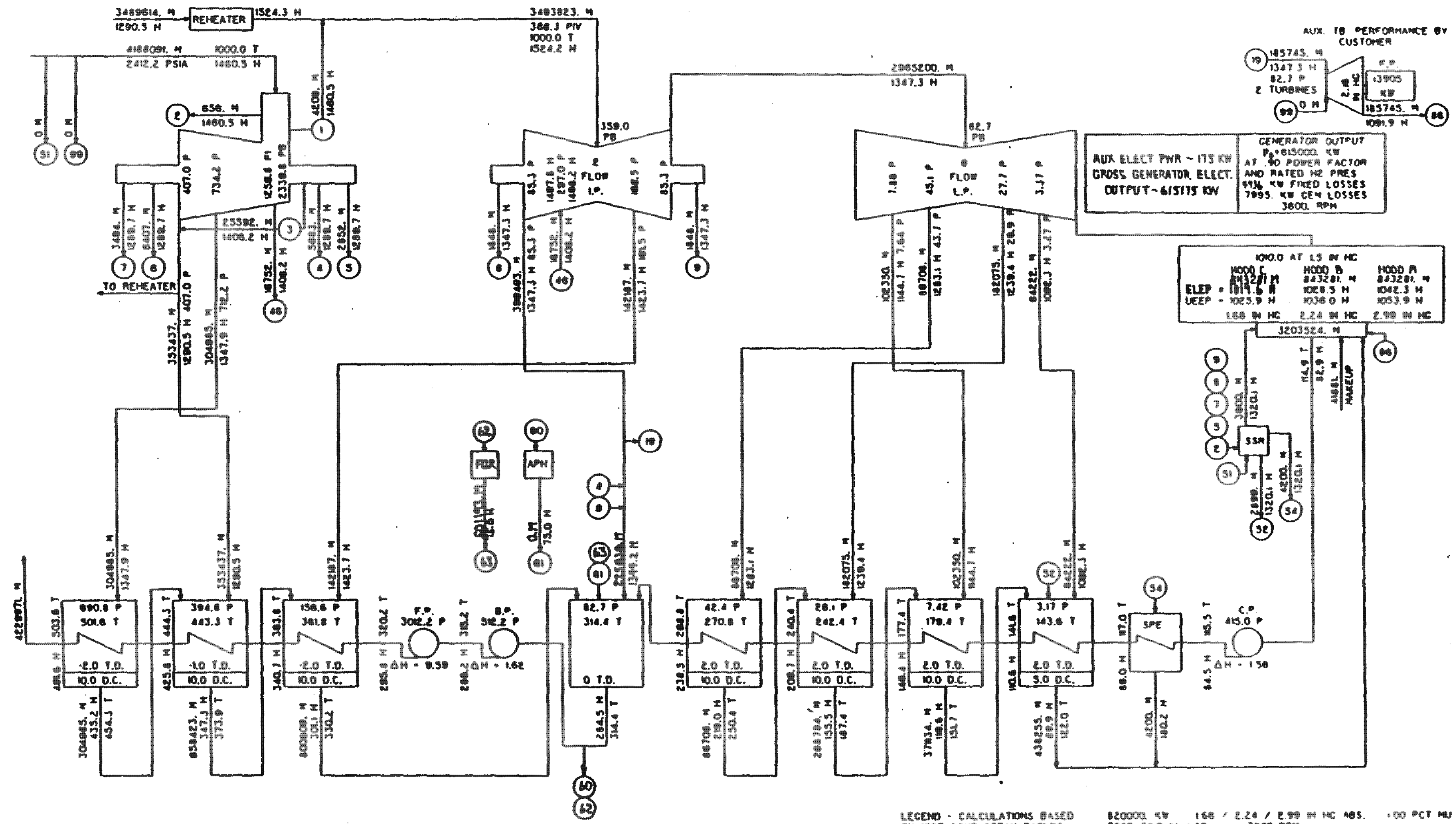
GENERAL ELECTRIC COMPANY SCHENECTADY N.Y.

YWO-OP
Fig. 17C

IP14_004886

481 HB 148

EXTRACTION ARRANGEMENT IS SCHEMATIC ONLY



CUSTOMER DEFINED VALVE BEST POINT NET HEAT RATE = $\frac{4188091.W(1460.5H-491.6H)+3489614.W(1524.3H-1290.5H)+3203524.W(1.56H)+4188.W(720.5H-491.6H)}{615000\ KW}$ = 7934 BTU/KW/HR

LEGEND - CALCULATIONS BASED ON 1967 ASME STEAM TABLES
W - FLOW-LB/HR
P - PRESSURE-PSIA
H - ENTHALPY-BTU/LB
T - TEMPERATURE-F DEGREES

620000. KW 1.68 / 2.24 / 2.99 IN HG ABS. 100 PCT MU
TC6F 30.0 IN. LSB 3600 RPM
2400 PSIG 1000. / 1000. T
GEN- 991000. KVA .90 PF LIO

KW Kran

534AT 1 DB0291 6840 0 13
481 HB 148 7-17-81

GENERAL ELECTRIC COMPANY. SCHENECTADY N.Y.

Fig. 17D

IP14_004887

615MW
Fig. 17D

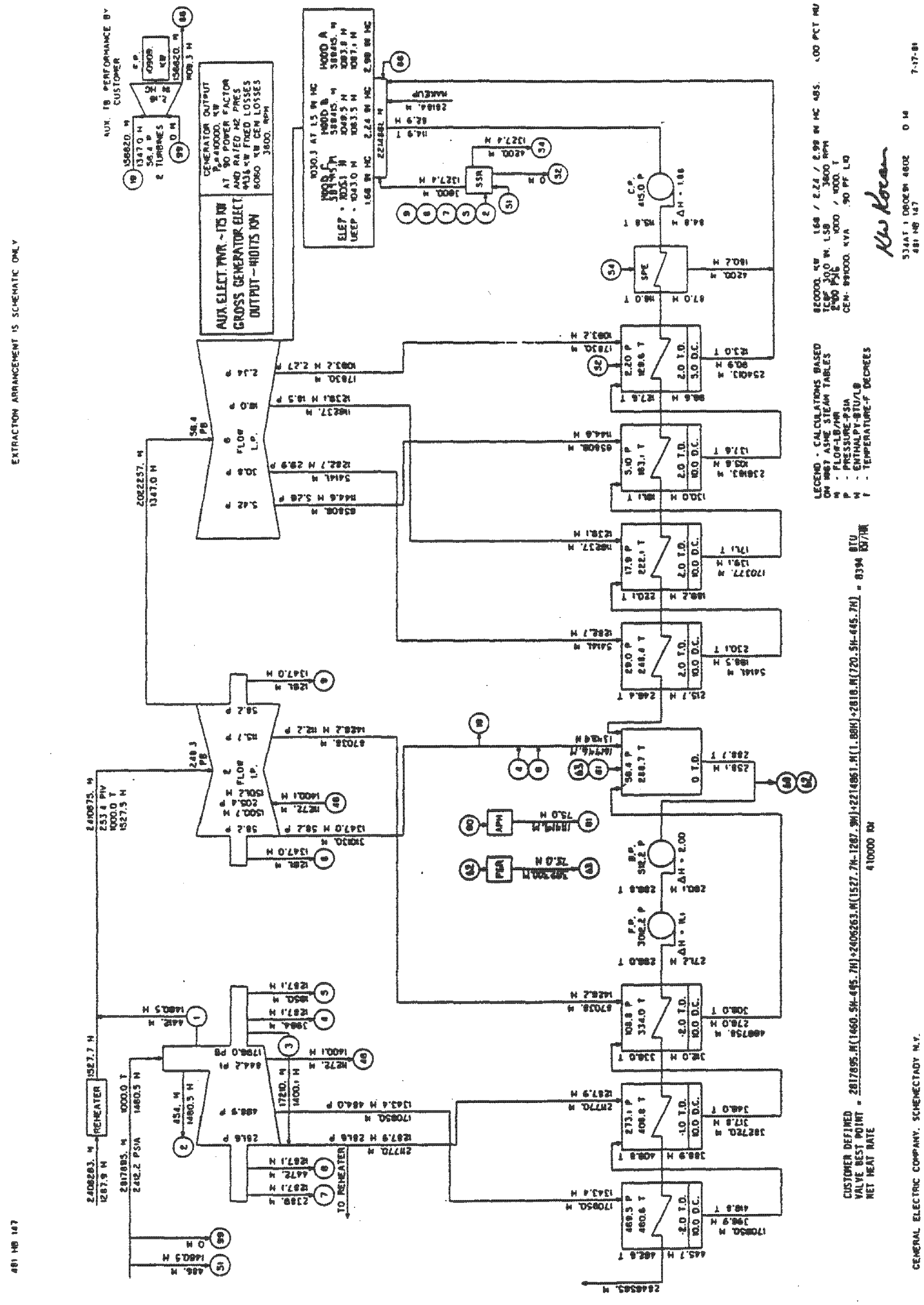


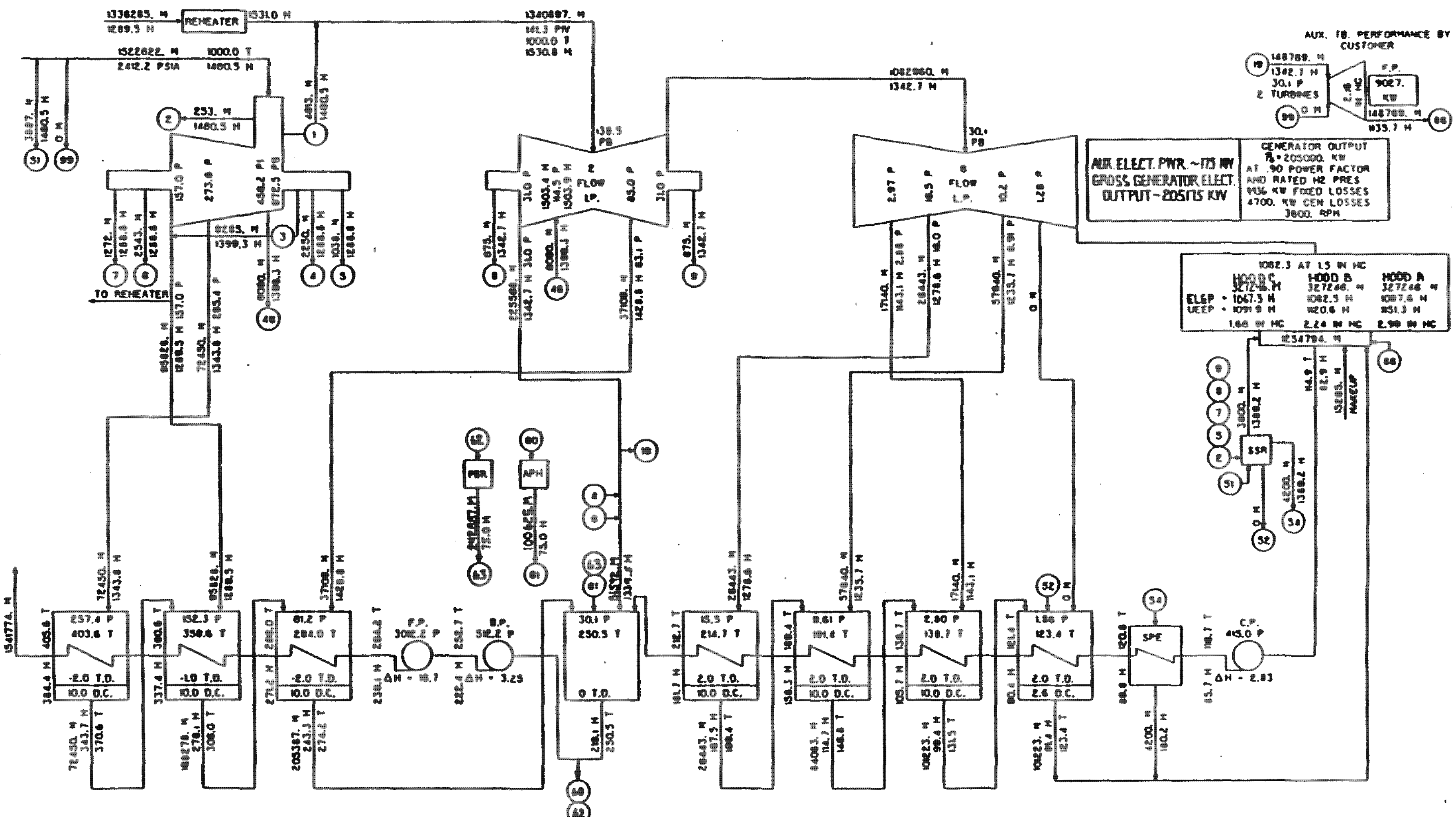
Fig. 17E

410MW

Fig. 17E

IP14_004888

EXTRACTION ARRANGEMENT IS SCHEMATIC ONLY



CUSTOMER DEFINED VALVE BEST POINT NET HEAT RATE = $\frac{1522622.M(1460.5H-384.4H)+1336285.M(1531.0H-1289.5H)+1254794.M(2.83H)+1523.M(720.5H-384.4H)}{205000\ KW}$ = 9587 BTU/KW/HR

LEGEND - CALCULATIONS BASED ON 1967 ASME STEAM TABLES
M - FLOW-LB/HR
P - PRESSURE-PSIA
H - ENTHALPY-BTU/LB
T - TEMPERATURE-F DEGREES

820000. KW 1.68 / 2.24 / 2.90 IN HC ABS. 1.00 PCT MU
TC6F 30.0 IN. LSB 3600 RPM
2400 PSIG 1000. / 1000. F
GEN- 891000. KVA .90 PF 1.10

KW Kora

534AT 1 080201 2466 0 15
481 HB 148 7-17-81

GENERAL ELECTRIC COMPANY, SCHENECTADY N.Y.

Fig. 17F

205MW
Fig. 17F

IP14_004889

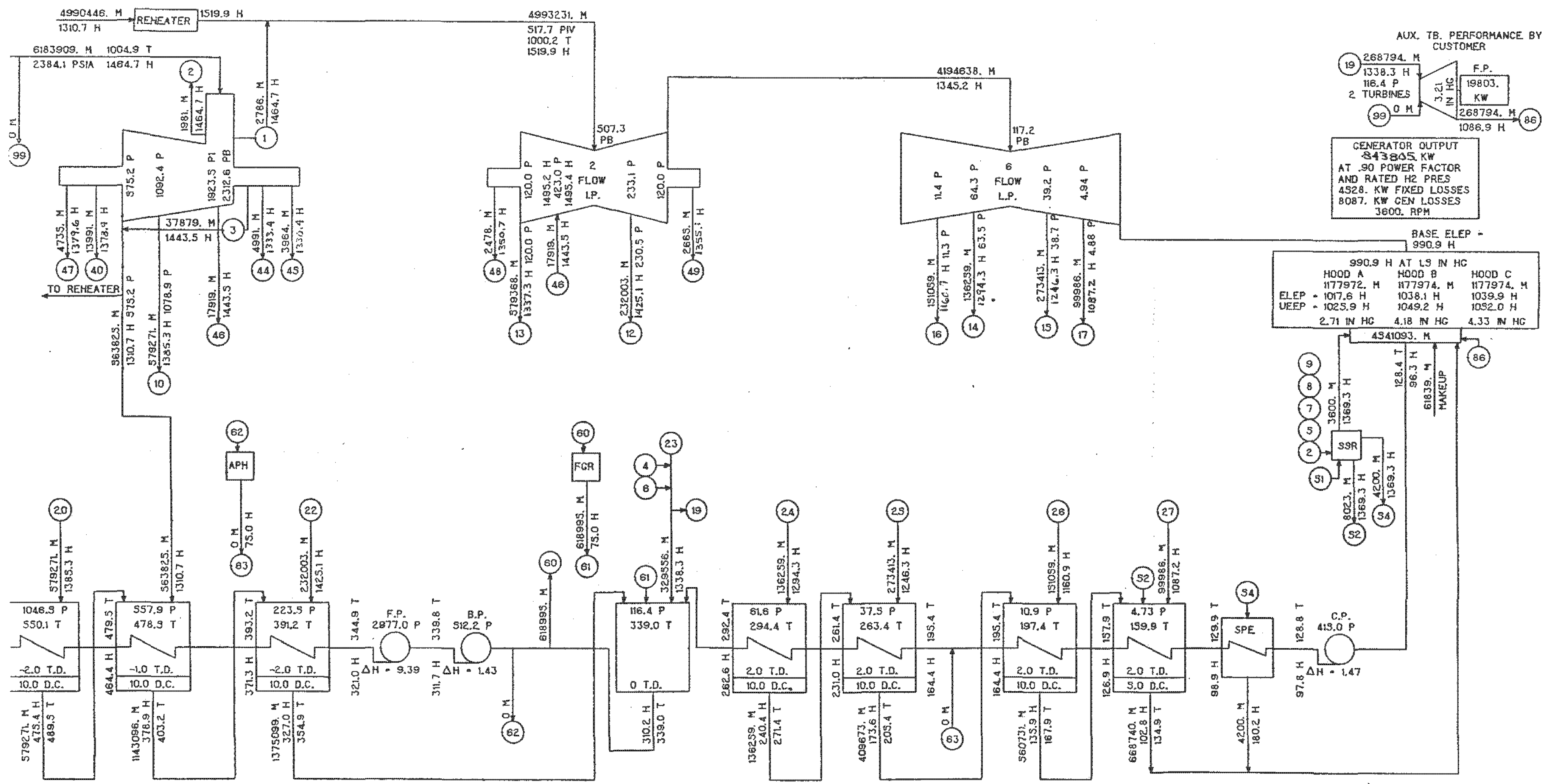
:G. 9A

TURBINE AND EXTRACTION ARRANGEMENT IS SCHEMATIC ONLY

CALCULATED DATA - NOT GUARANTEED

CONTRACT CYCLE HEAT BALANCE TEST No. 2

RATING FLOW IS 5979059. M AT INLET STEAM CONDITIONS OF 2412.2 PSIA AND 1000.0 T TO ASSURE THAT THE TURBINE WILL PASS THIS FLOW. CONSIDERING VARIATIONS IN FLOW COEFFICIENTS FROM EXPECTED VALUES. SHOP TOLERANCES ON DRAWING AREAS. ETC. WHICH MAY AFFECT THE FLOW. THE TURBINE IS BEING DESIGNED FOR A DESIGN FLOW (RATING FLOW PLUS 5.0 PERCENT) OF 6278012. M THE EQUIVALENT DESIGN FLOW AT 2384.1 PSIA AND 1004.9 T IS 6183893. M .
THE VALUE OF GENERATOR OUTPUT SHOWN ON THIS HEAT BALANCE IS AFTER ALL POWER FOR EXCITATION AND OTHER TURBINE-GENERATOR AUXILIARIES HAS BEEN DEDUCTED.



4541093 (1.47)
+6183.9 (716.4 - 548.8)
+6183909. (1464.7 - 548.8)
POINT +4990446. (1519.9 - 1310.7)
TE = ——— = 7985.9 BTU / KW-HR
843805.

LEGEND - CALCULATIONS BASED ON 1967 ASME STEAM TABLES
M - FLOW-LB/HR
P - PRESSURE-PSIA
H - ENTHALPY-BTU/LB
T - TEMPERATURE-F DEGREES

9948T 1 0 1

KW / / IN HG ABS.
CONTRACT CYCLE HEAT BALANCE TEST NO.2
TC6F 30.0 IN. LSB 3600 RPM
2400.0 PSIA 1000. / 1000. T
GEN- 991000. KVA .90 PF LIQ

FIG. 9A

5/14/87

RAL ELECTRIC COMPANY. SCHENECTADY N.Y.

IP14_004890

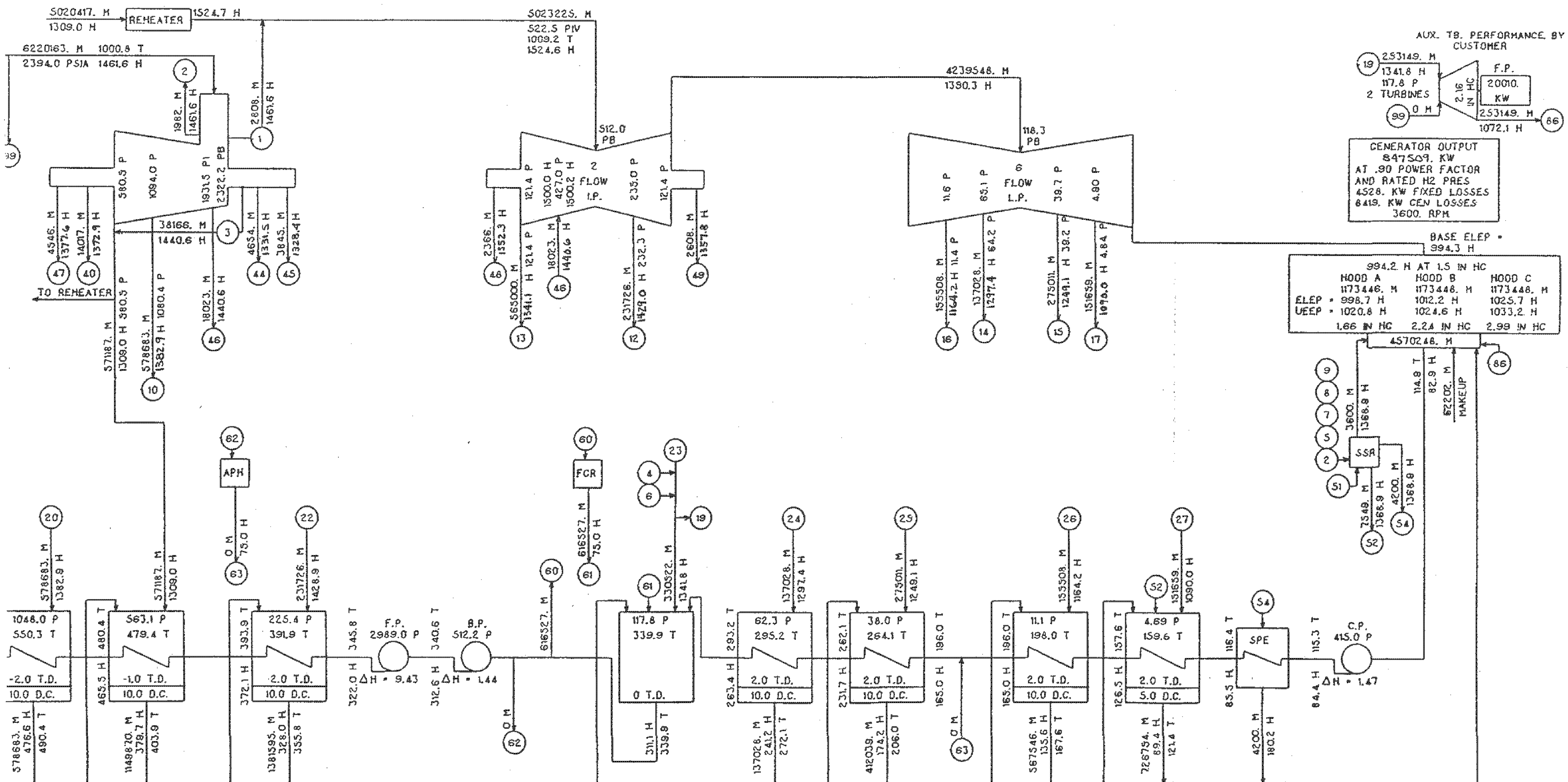
. 9C

TURBINE AND EXTRACTION ARRANGEMENT IS SCHEMATIC ONLY

CALCULATED DATA - NOT GUARANTEED

RATING FLOW IS 5974568. M AT INLET STEAM CONDITIONS OF 2412.2 PSIA AND 1000.0 T TO ASSURE THAT THE TURBINE WILL PASS THIS FLOW, CONSIDERING VARIATIONS IN FLOW COEFFICIENTS FROM EXPECTED VALUES, SHOP TOLERANCES ON DRAWING AREAS, ETC. WHICH MAY AFFECT THE FLOW, THE TURBINE IS BEING DESIGNED FOR A DESIGN FLOW (RATING FLOW PLUS 5.0 PERCENT) OF 6273296. M
THE EQUIVALENT DESIGN FLOW AT 2394.0 PSIA AND 1000.8 T IS 6220190. M .
THE VALUE OF GENERATOR OUTPUT SHOWN ON THIS HEAT BALANCE IS AFTER ALL POWER FOR EXCITATION AND OTHER TURBINE-GENERATOR AUXILIARIES HAS BEEN DEDUCTED.

CONTRACT CYCLE HEAT BALANCE TEST No.4



$$\frac{4570248.\,(1.47) + 6620.2\,(719.6 - 549.0) + 6220163.\,(1461.6 - 549.0) + 5020417.\,(1524.7 - 1309.0)}{847509.} = 7984.9\ \frac{BTU}{KW\text{-}HR}$$

OINT
E

LEGEND - CALCULATIONS BASED ON 1967 ASME STEAM TABLES
M - FLOW-LB/HR
P - PRESSURE-PSIA
H - ENTHALPY-BTU/LB
T - TEMPERATURE-F DEGREES

9694T 1 0 1

KW / / IN HG ABS.
CONTRACT CYCLE HEAT BALANCE TEST NO.4
TC6F 30.0 IN. LSB 3600 RPM
2400.0 PSIA 1000. / 1000. T
GEN- 991000. KVA .90 PF L10

Fig. 9C

5/14/67

AL ELECTRIC COMPANY. SCHENECTADY N.Y.

FIG. 9E

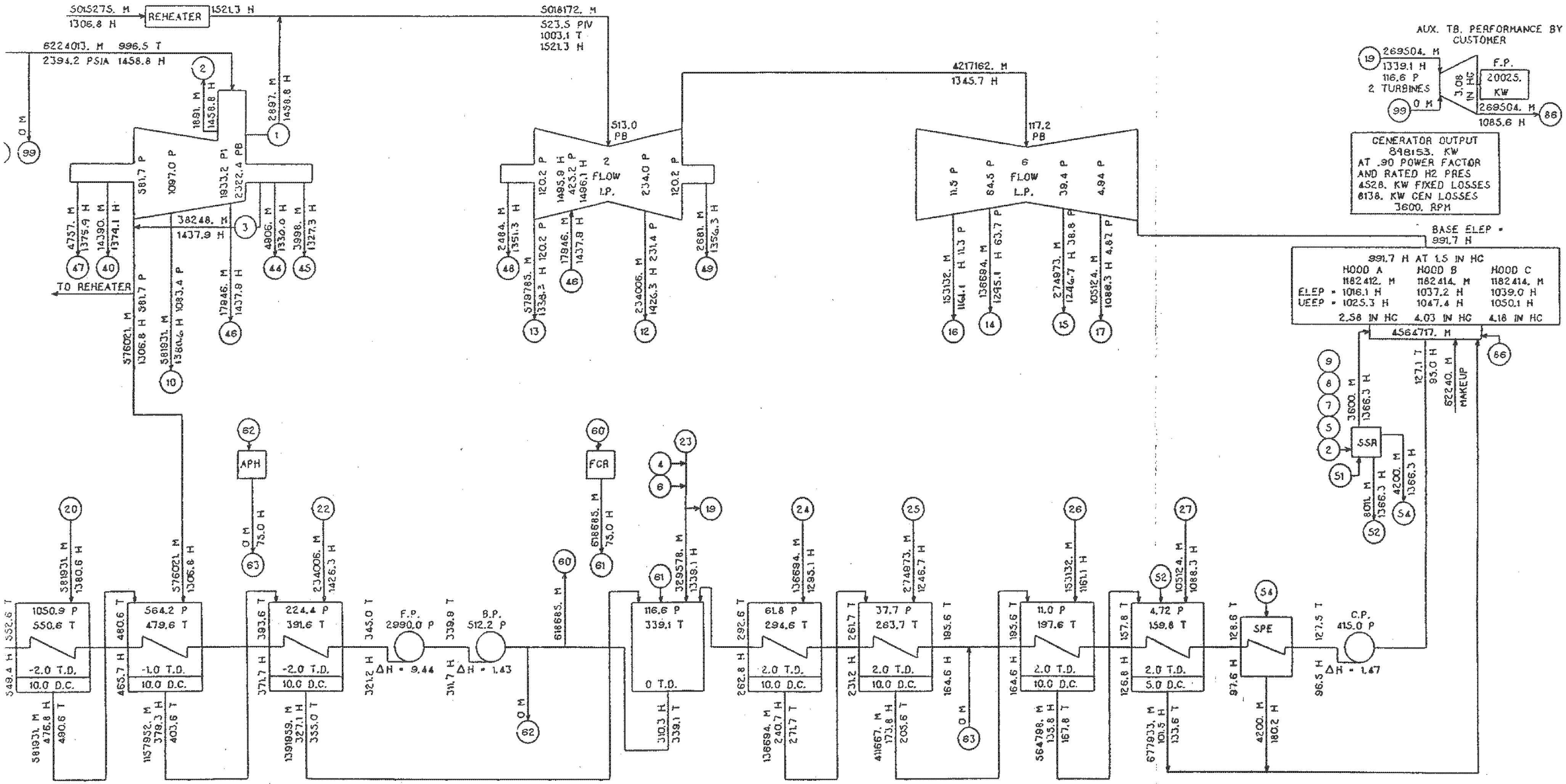
TURBINE AND EXTRACTION ARRANGEMENT IS SCHEMATIC ONLY

CALCULATED DATA - NOT GUARANTEED

CONTRACT CYCLE HEAT BALANCE TEST No. 6

RATING FLOW IS 5963946. M AT INLET STEAM CONDITIONS OF 2412.2 PSIA AND 1000.0 T TO ASSURE THAT THE TURBINE WILL PASS THIS FLOW, CONSIDERING VARIATIONS IN FLOW COEFFICIENTS FROM EXPECTED VALUES, SHOP TOLERANCES ON DRAWING AREAS, ETC. WHICH MAY AFFECT THE FLOW, THE TURBINE IS BEING DESIGNED FOR A DESIGN FLOW (RATING FLOW PLUS 5.0 PERCENT) OF 6262143. M THE EQUIVALENT DESIGN FLOW AT 2394.2 PSIA AND 996.5 T IS 6223999. M.

THE VALUE OF GENERATOR OUTPUT SHOWN ON THIS HEAT BALANCE IS AFTER ALL POWER FOR EXCITATION AND OTHER TURBINE-GENERATOR AUXILIARIES HAS BEEN DEDUCTED.



$$\text{HEAT RATE} = \frac{4564717.\,(1.47) + 6224.0\,(719.6 - 549.4) + 6224013.\,(1458.8 - 549.4) + 5015275.\,(1521.3 - 1306.8)}{848153.} = 7951.3\ \frac{\text{BTU}}{\text{KW-HR}}$$

'T POINT
RATE

LEGEND - CALCULATIONS BASED ON 1967 ASME STEAM TABLES
M - FLOW-LB/HR
P - PRESSURE-PSIA
H - ENTHALPY-BTU/LB
T - TEMPERATURE-F DEGREES

9613T 1 0 1

KW / / IN HG ABS.
CONTRACT CYCLE HEAT BALANCE TEST NO.6
TC6F 30.0 IN. LSB 3600 RPM
2400.0 PSIA 1000. / 1000. T
GEN- 991000. KVA .90 PF LIQ

Fig. 9E

NERAL ELECTRIC COMPANY. SCHENECTADY N.Y.

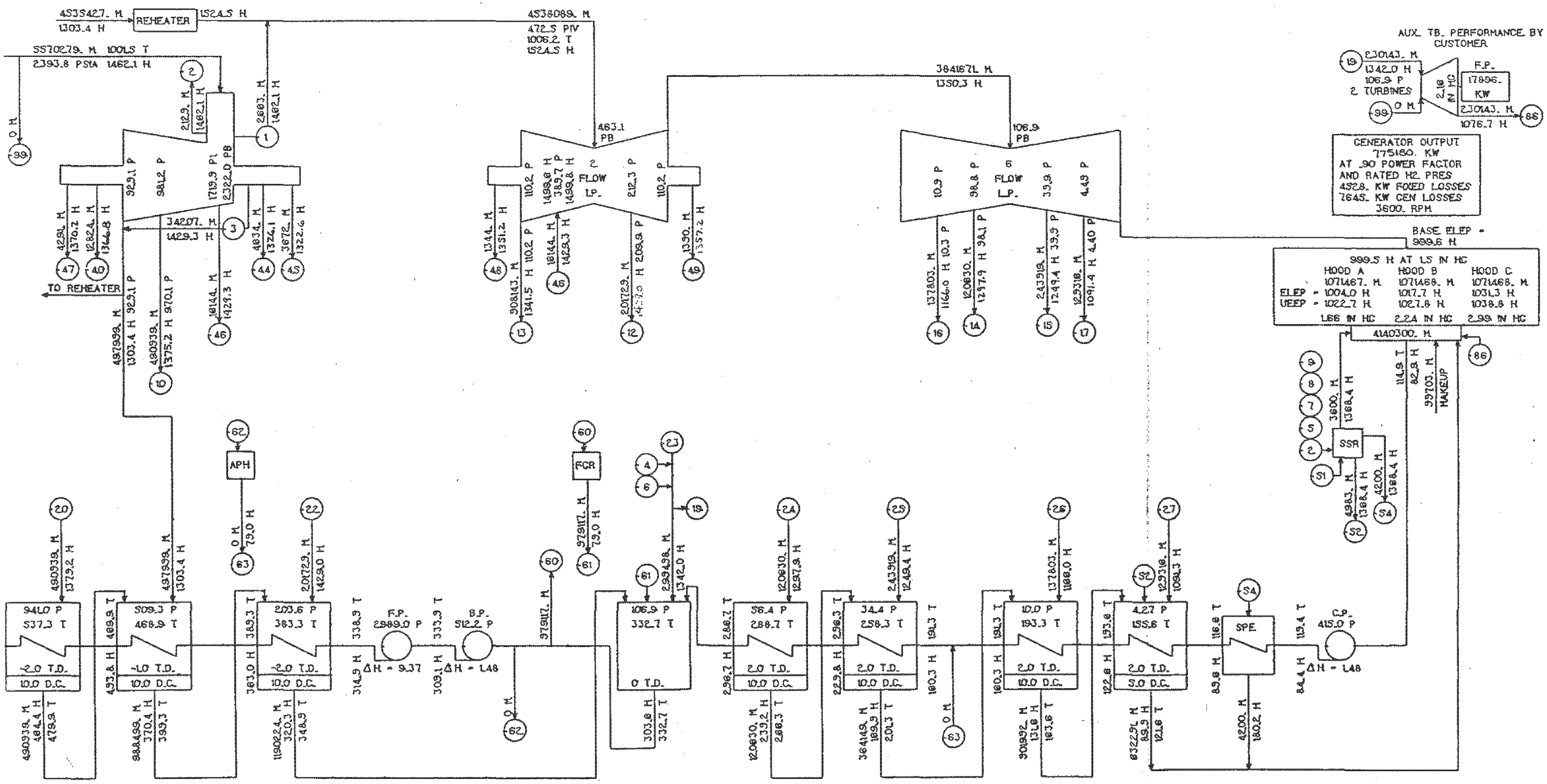
5/14/67

FIG. 9D

TURBINE AND EXTRACTION ARRANGEMENT IS SCHEMATIC ONLY

CONTRACT CYCLE HEAT BALANCE TEST No.5

THE VALUE OF GENERATOR OUTPUT SHOWN ON THIS HEAT BALANCE IS AFTER ALL POWER FOR EXCITATION AND OTHER TURBINE-GENERATOR AUXILIARIES HAS BEEN DEDUCTED.



POINT RATE = (4146300. (1.48) + 9970.3 (719.6 - 533.2) + 5570279. (1462.1 - 533.2) + 4535427. (1524.5 - 1303.4)) / 775180. = 7977.7 BTU/KW-HR

LEGEND - CALCULATIONS BASED ON 1967 ASME STEAM TABLES
M - FLOW-LB/HR
P - PRESSURE-PSIA
H - ENTHALPY-BTU/LB
T - TEMPERATURE-F DEGREES

9610T 1 0 1

KW / / IN HC ABS.
CONTRACT CYCLE HEAT BALANCE TEST NO.5
TC6F 30.0 IN. LSB 3600 RPM
2400.0 PSIA 1000. / 1000. T
GEN- 981000. KVA .90 PF LIQ

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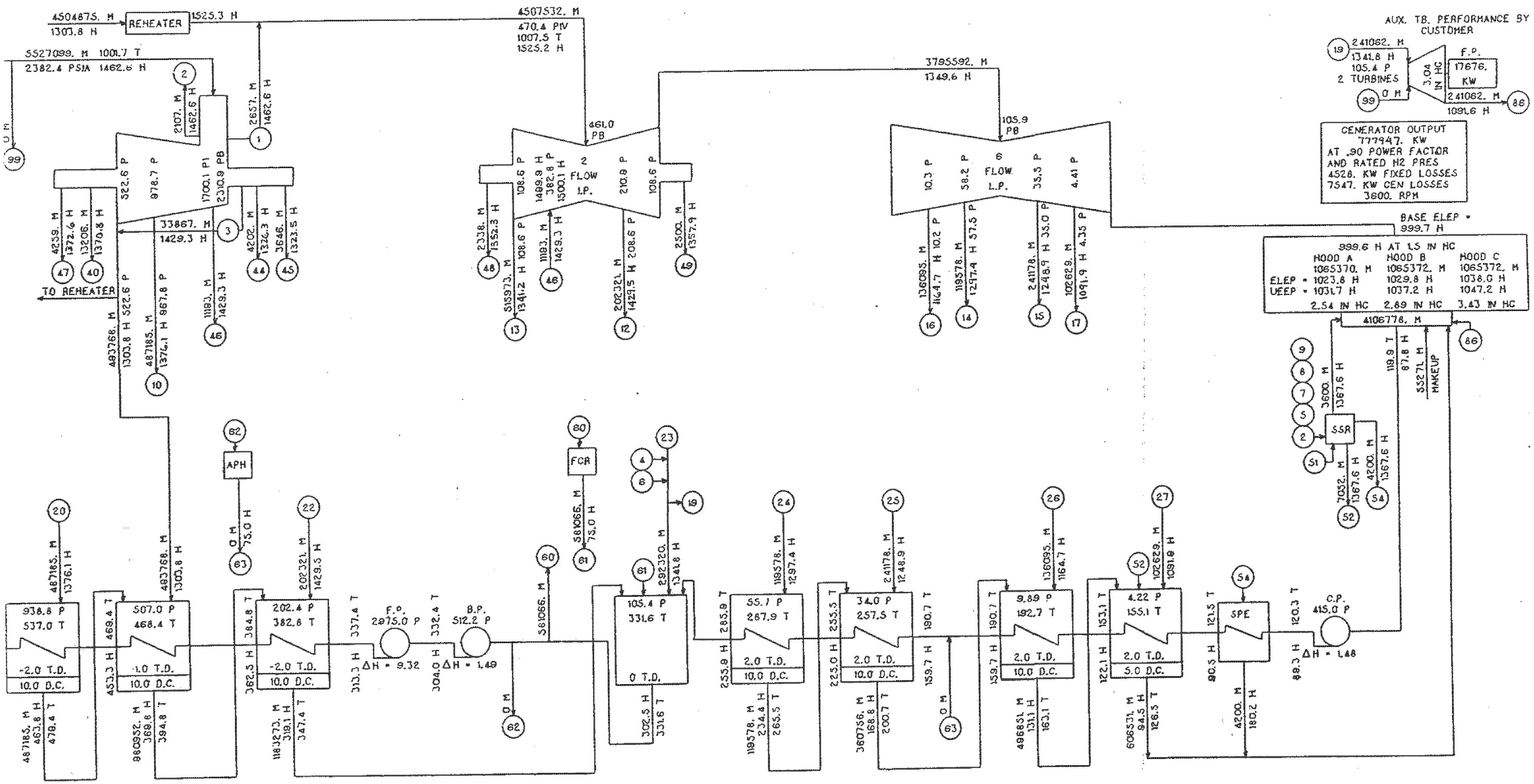
FIG. 9D

:. 9H

TURBINE AND EXTRACTION ARRANGEMENT IS SCHEMATIC ONLY

CONTRACT CYCLE HEAT BALANCE TEST No. 10

THE VALUE OF GENERATOR OUTPUT SHOWN ON THIS HEAT BALANCE IS AFTER ALL POWER FOR EXCITATION AND OTHER TURBINE-GENERATOR AUXILIARIES HAS BEEN DEDUCTED.



$$\text{POINT RATE} = \frac{\begin{array}{l} 4106778.\ (1.48) \\ +\ 5527.1\ (718.2 - 532.9) \\ +\ 5527099.\ (1462.6 - 532.9) \\ +\ 4504875.\ (1525.3 - 1303.8) \end{array}}{777947.} = 7897.2\ \frac{\text{BTU}}{\text{KW-HR}}$$

LEGEND - CALCULATIONS BASED ON 1967 ASME STEAM TABLES
M - FLOW-LB/HR
P - PRESSURE-PSIA
H - ENTHALPY-BTU/LB
T - TEMPERATURE-F DEGREES

KW / / IN HG ABS.
CONTRACT CYCLE HEAT BALANCE TEST NO.10
TC6F 30.0 IN. LSB 3600 RPM
2400.0 PSIA 1000. / 1000. T
GEN- 991000. KVA .90 PF L10

9624T 1 0 1

5/14/87

Fig. 9H

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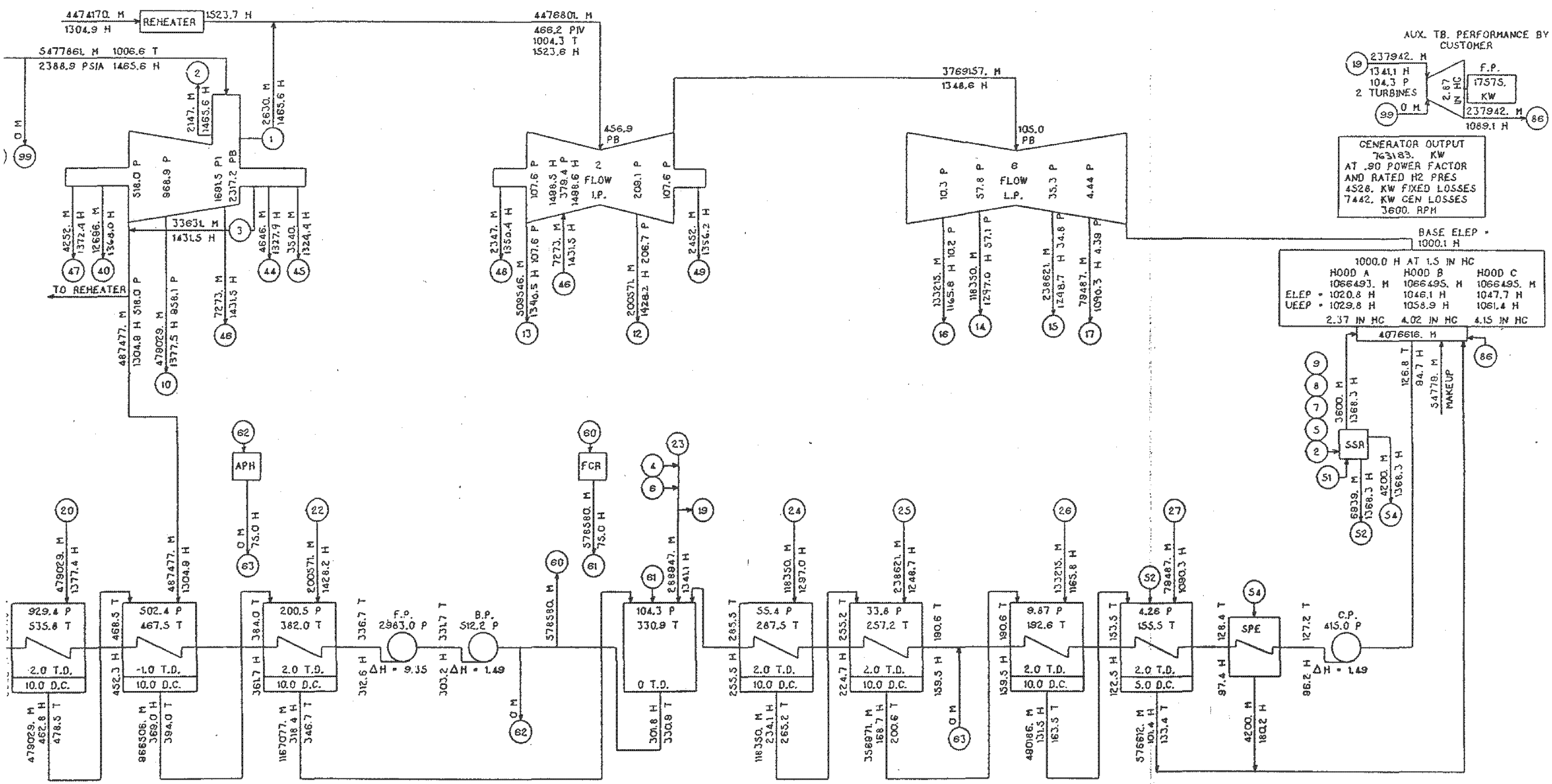
IP14_004894

FIG. 9F

CONTRACT CYCLE HEAT BALANCE TEST No.7

TURBINE AND EXTRACTION ARRANGEMENT IS SCHEMATIC ONLY

THE VALUE OF GENERATOR OUTPUT SHOWN ON THIS HEAT BALANCE IS AFTER ALL POWER FOR EXCITATION AND OTHER TURBINE-GENERATOR AUXILIARIES HAS BEEN DEDUCTED.



[?] POINT [?]RATE = $\dfrac{\begin{array}{l}4076616. (1.49)\\ +5477.9 (719.0 - 531.5)\\ +5477861 (1465.6 - 531.5)\\ +4474170. (1523.7 - 1304.9)\end{array}}{763183.}$ = 7996.9 $\dfrac{\text{BTU}}{\text{KW-HR}}$

LEGEND - CALCULATIONS BASED ON 1967 ASME STEAM TABLES
M - FLOW-LB/HR
P - PRESSURE-PSIA
H - ENTHALPY-BTU/LB
T - TEMPERATURE-F DEGREES

9619T 1 0 1

KW / / IN HG ABS.
CONTRACT CYCLE HEAT BALANCE TEST NO.7
TC6F 30.0 IN. LSB 3600 RPM
2400.0 PSIA 1000. / 1000. T
GEN- 991000. KVA .90 PF LIQ

[?]ERAL ELECTRIC COMPANY. SCHENECTADY N.Y.

5/14/87
FIG. 9F

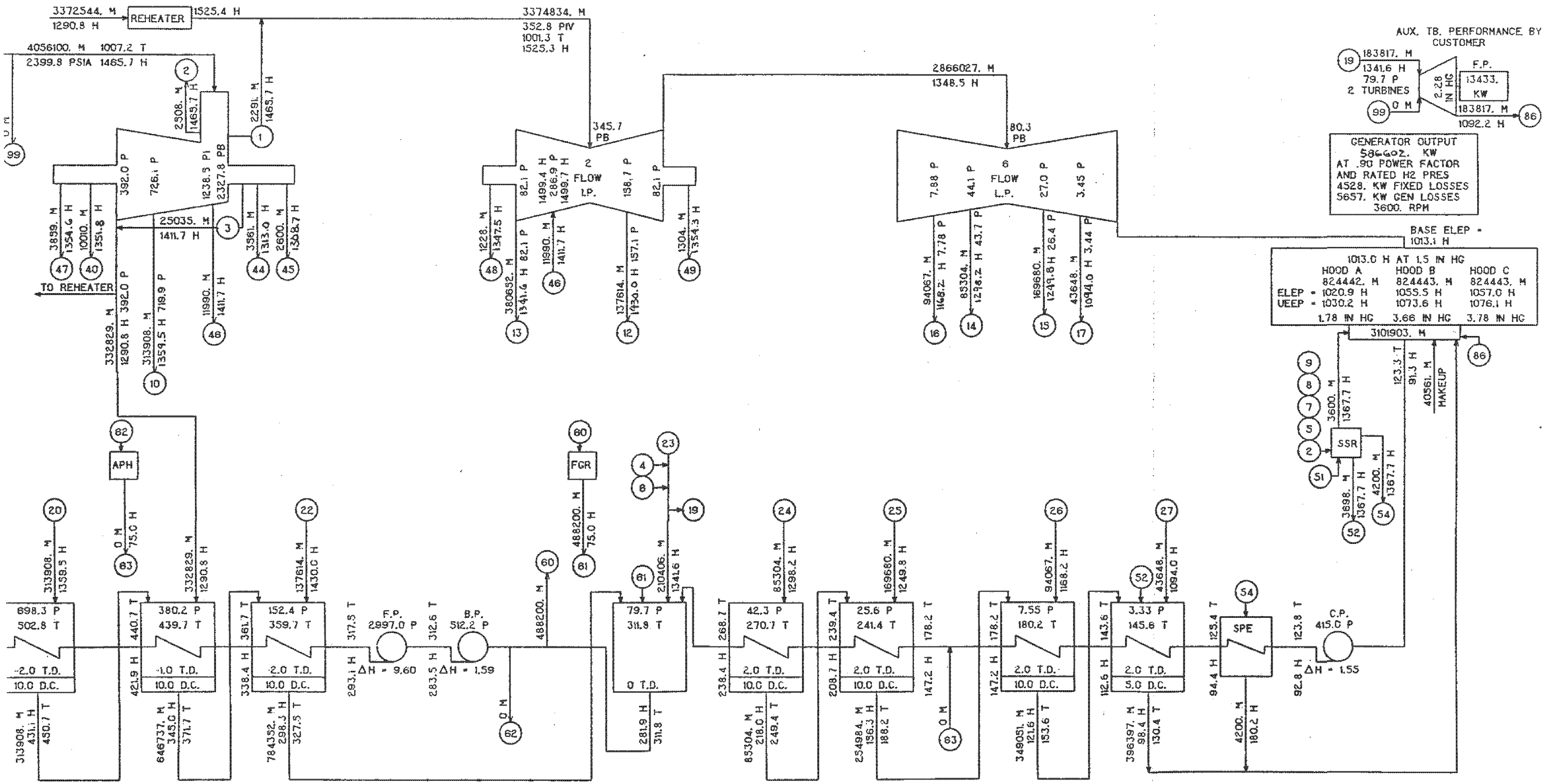
IP14_004895

C. 9B

TURBINE AND EXTRACTION ARRANGEMENT IS SCHEMATIC ONLY

CONTRACT CYCLE HEAT BALANCE TEST No. 3

THE VALUE OF GENERATOR OUTPUT SHOWN ON THIS HEAT BALANCE IS AFTER ALL POWER FOR EXCITATION AND OTHER TURBINE-GENERATOR AUXILIARIES HAS BEEN DEDUCTED.



3101963 (1.55)
+4056.1 (720.3 - 493.0)
+4056100. (1465.7 - 493.0)

POINT / TE: $\frac{+3372544. \,(1525.4 - 1290.8)}{586602.} = 8084.6 \frac{\text{BTU}}{\text{KW-HR}}$

LEGEND - CALCULATIONS BASED ON 1967 ASME STEAM TABLES
M - FLOW-LB/HR
P - PRESSURE-PSIA
H - ENTHALPY-BTU/LB
T - TEMPERATURE-F DEGREES

KW / / IN HG ABS.
CONTRACT CYCLE HEAT BALANCE TEST NO.3
TC6F 30.0 IN. LSB 3600 RPM
2400.0 PSIA 1000. / 1000. F
GEN- 991000. KVA .90 PF L10

9046T 1 0 1

RAL ELECTRIC COMPANY. SCHENECTADY N.Y.

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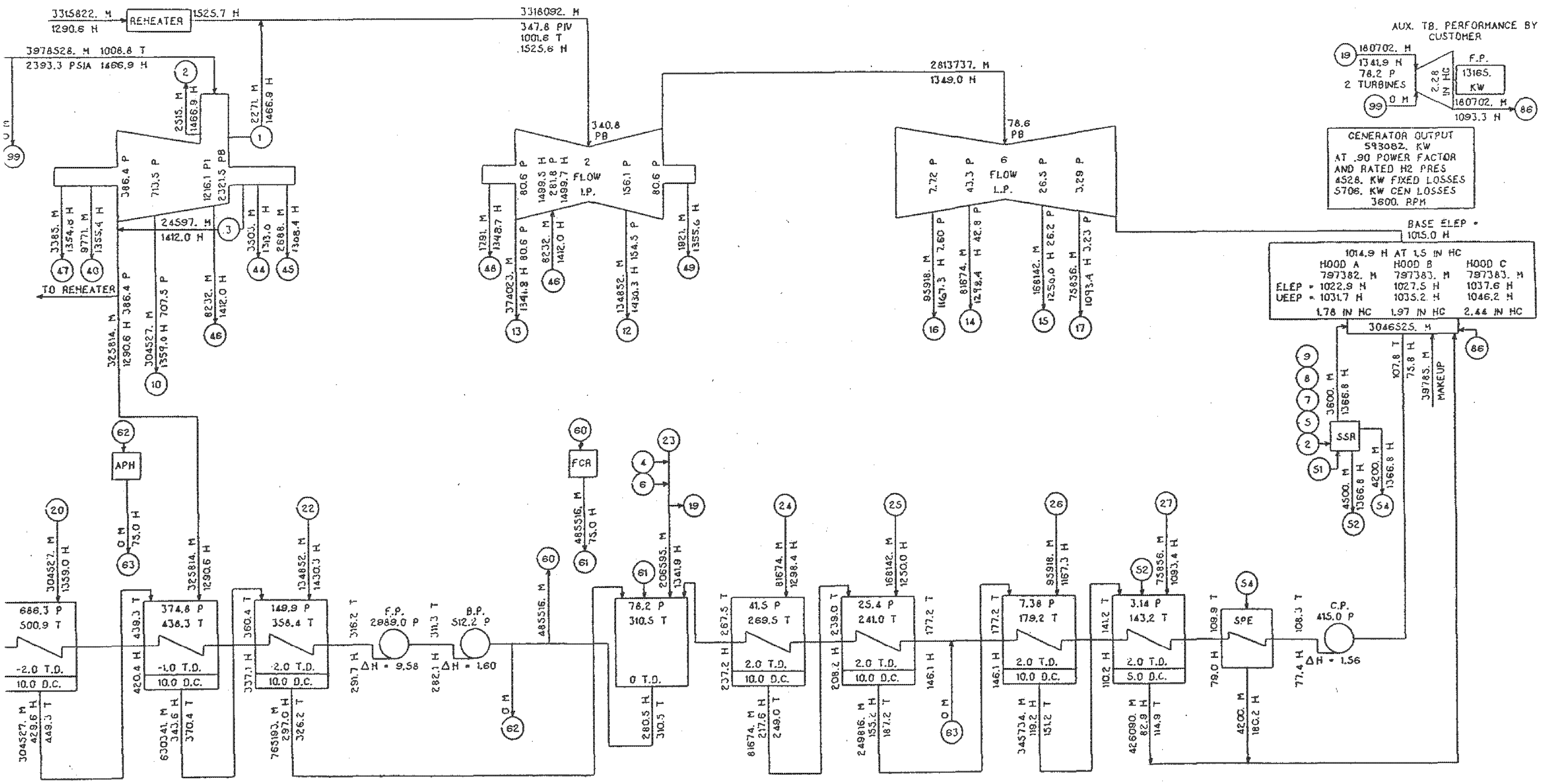
FIG. 9B

C. 9G

CONTRACT CYCLE HEAT BALANCE TEST No. 9

TURBINE AND EXTRACTION ARRANGEMENT IS SCHEMATIC ONLY

THE VALUE OF GENERATOR OUTPUT SHOWN ON THIS HEAT BALANCE IS AFTER ALL POWER FOR EXCITATION AND OTHER TURBINE-GENERATOR AUXILIARIES HAS BEEN DEDUCTED.



POINT RATE $= \dfrac{3978.5\ (719.5 - 490.8) + 3046525.\ (1.54) + 3978528.\ (1466.9 - 490.8) + 3315822.\ (1525.7 - 1290.6)}{593082.} = 7872.3\ \dfrac{\text{BTU}}{\text{KW-HR}}$

LEGEND - CALCULATIONS BASED ON 1967 ASME STEAM TABLES
M - FLOW-LB/HR
P - PRESSURE-PSIA
H - ENTHALPY-BTU/LB
T - TEMPERATURE-F DEGREES

9799T 1 0 1

KW / / IN HC ABS.
CONTRACT CYCLE HEAT BALANCE TEST NO.9
TC6F 30.0 IN. LSB 3600 RPM
2400.0 PSIA 1000. / 1000. T
GEN- 991000. KVA .90 PF 1.10

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5/14/87

FIG. 9G

APPENDIX A

Computer Output for Test Cycle Heat Balances for Test Points 2-10

Output Sheets

These output sheets should be used in conjunction with the trunkline diagram shown in Figure A1.

The following is a list of the nomenclature used in these output sheets:

FW	Feedwater
Inj	Injection
Ret	Return
MU	Makeup
LO	Leakoff
Shell	Conditions in turbine
Exh	Exhaust
AE	Available energy
ELEP	Expansion line end point
UEEP	Used energy end point
V_{AN}	Annulus velocity
TL	Trunkline
P	Pressure - psia
T	Temperature - degrees F
H	Enthalpy, BTU/LB
Q	Flow, lb./hr.
SV	Specific volume - ft^3/lb
SSR	Steam seal regulator

Pages 1 and 2 of the output sheets for each test point contain general information on turbine and cycle performance, such as heat rate, throttle flow, section efficiencies, and stage flow function. On page 1 under label "rated conditions", the load and heat rate have been corrected to rated power factor and rated H_2 pressure, and the throttle flow has been corrected to 2400 psig/1000F.

Pages 3-6 include designated component information. The column (TL) to the left of each sheet is a trunkline number used to easily identify points in the cycle. These TL numbers correspond to the number on sheet A1.

Pages 7 and 8 are a tabulation of all information stored in all trunklines. Although much of the same information is already included on pages 3-6, it is reprinted in TL form because not all TL numbers are printed on pages 3-6 and it is easier under some circumstances to look up information on the TL printout.

The column headings for the TL sheets are from left to right (TL) trunkline number, (P) pressure-psia, (T) temperature - ^{o}F, (H) enthalty - Btu/lb., (Q) flow lb./hr., (SV) specific volume-ft^3/lb. in most cases, (SP) an additional fluid property needed in the calculation such as enthalpy, (PV)-(P)/(SV) in most cases but not all; and (TR) transient storage for information needed in the calculation. This last storage area will also contain $(Q)/A \sqrt{(P)/(SV)}$

The page numbering system is as follows:

A0 3-1

where A is for appendix A and 3-1 identifies the test point as 3 and the page number as 1.

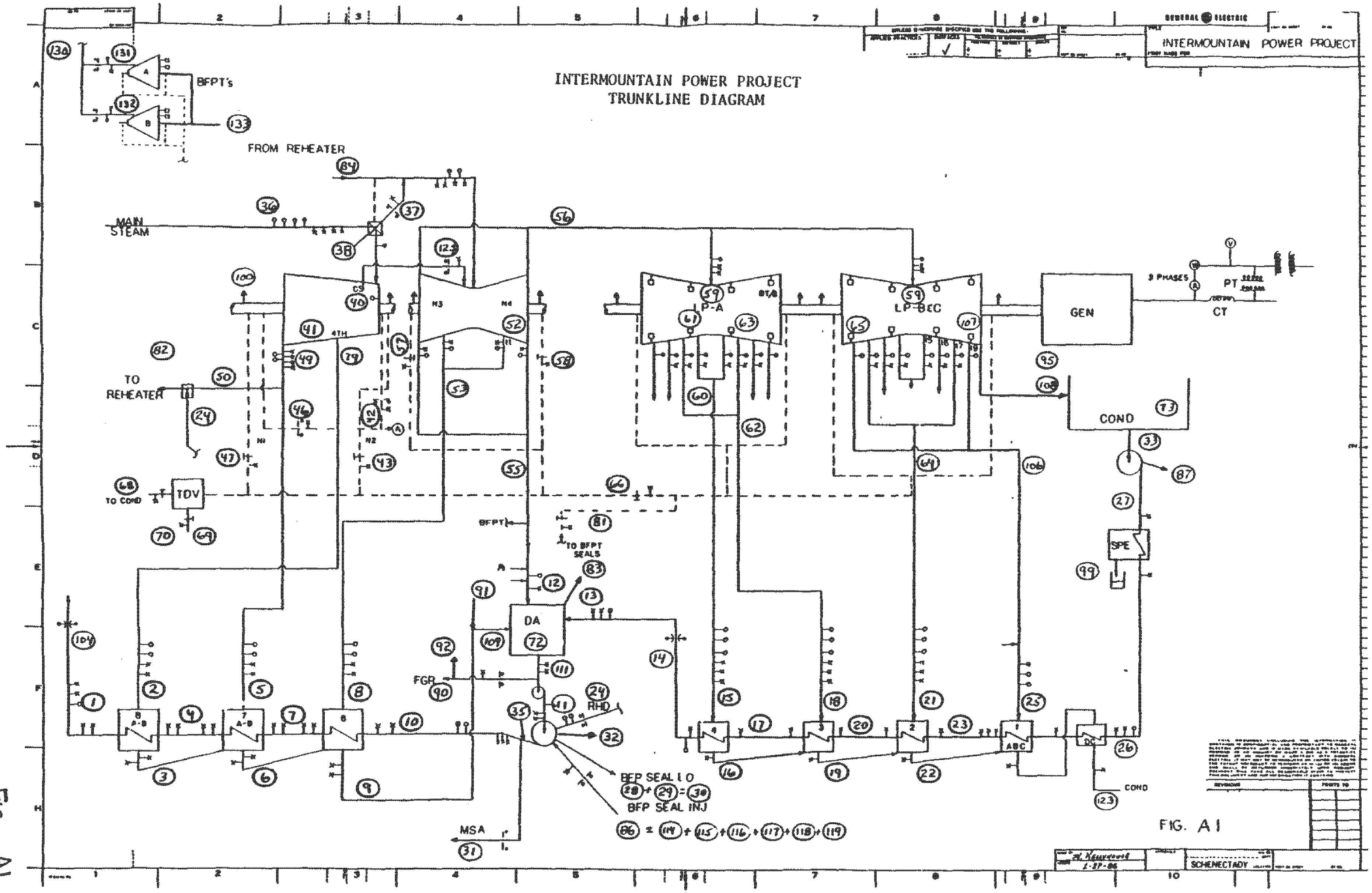


Fig. A1

IP14_004900

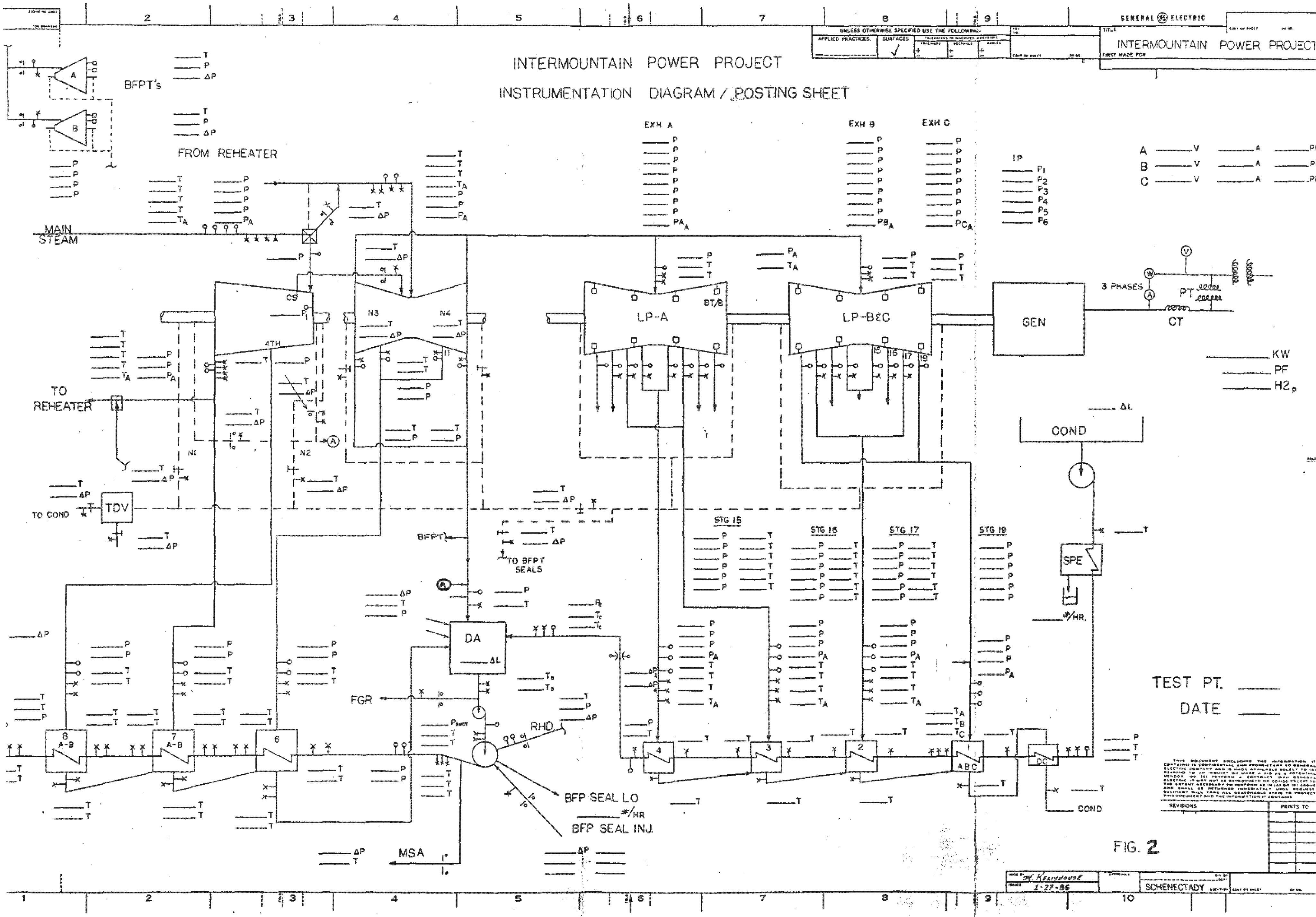

INTERMOUNTAIN POWER PROJECT
INSTRUMENTATION DIAGRAM / POSTING SHEET
GENERAL ELECTRIC
INTERMOUNTAIN POWER PROJECT
UNLESS OTHERWISE SPECIFIED USE THE FOLLOWING
APPLIED PRACTICES
SURFACES
BFPT's
FROM REHEATER
MAIN STEAM
TO REHEATER
TO COND
TDV
EXH A
EXH B
EXH C
IP
LP-A
LP-B&C
GEN
3 PHASES
PT
CT
KW
PF
H2p
COND
STG 15
STG 16
STG 17
STG 19
SPE
#/HR.
DA
FGR
RHD
BFP SEAL LO
BFP SEAL INJ.
MSA
BFPT
TO BFPT SEALS
TEST PT.
DATE
SCHENECTADY
1-27-86
REVISIONS
PRINTS TO

FIG. 2

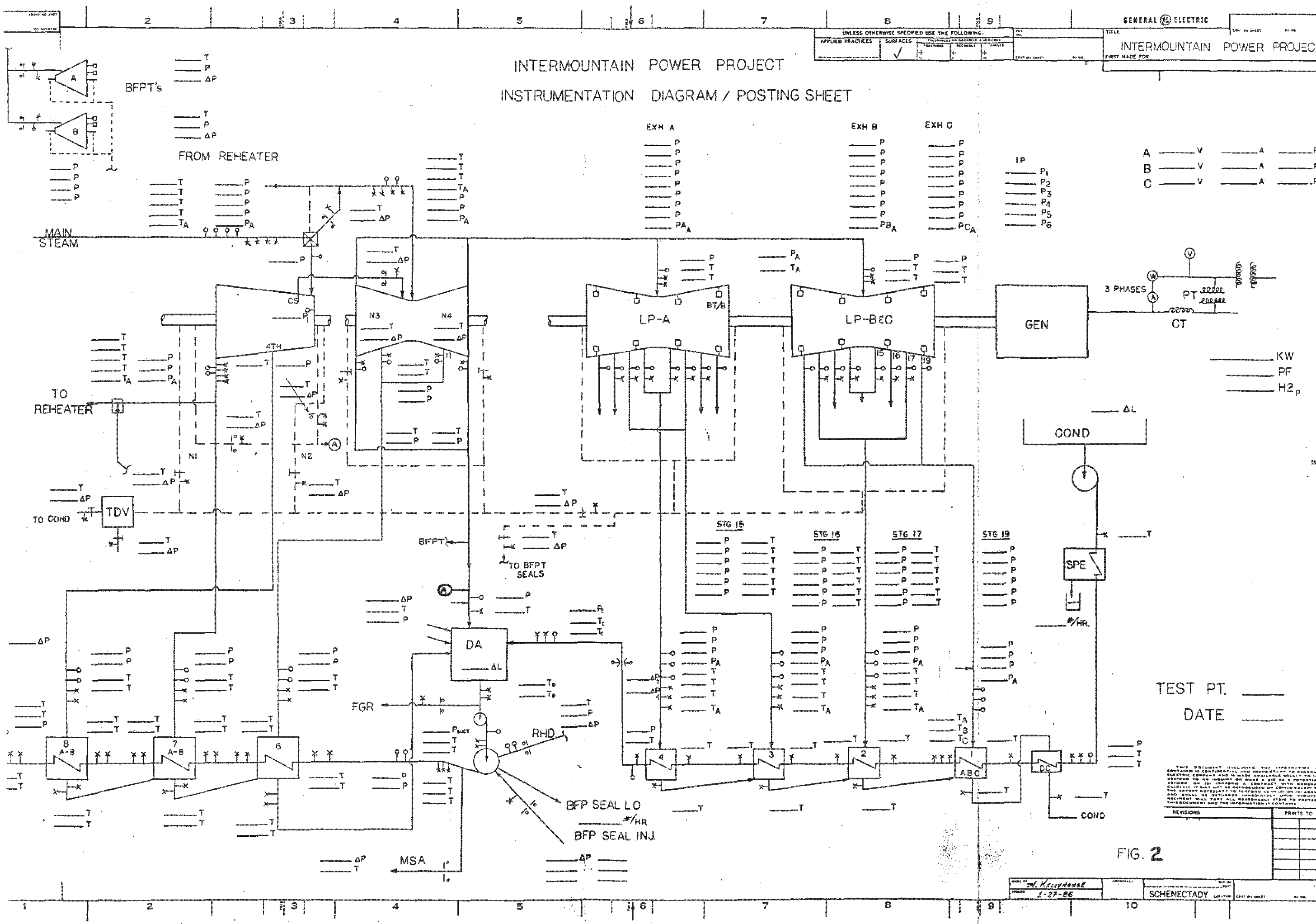


FIG. 2

IP14_004902

INTERMOUNTAIN POWER PROJECT

INSTRUMENTATION DIAGRAM / POSTING SHEET

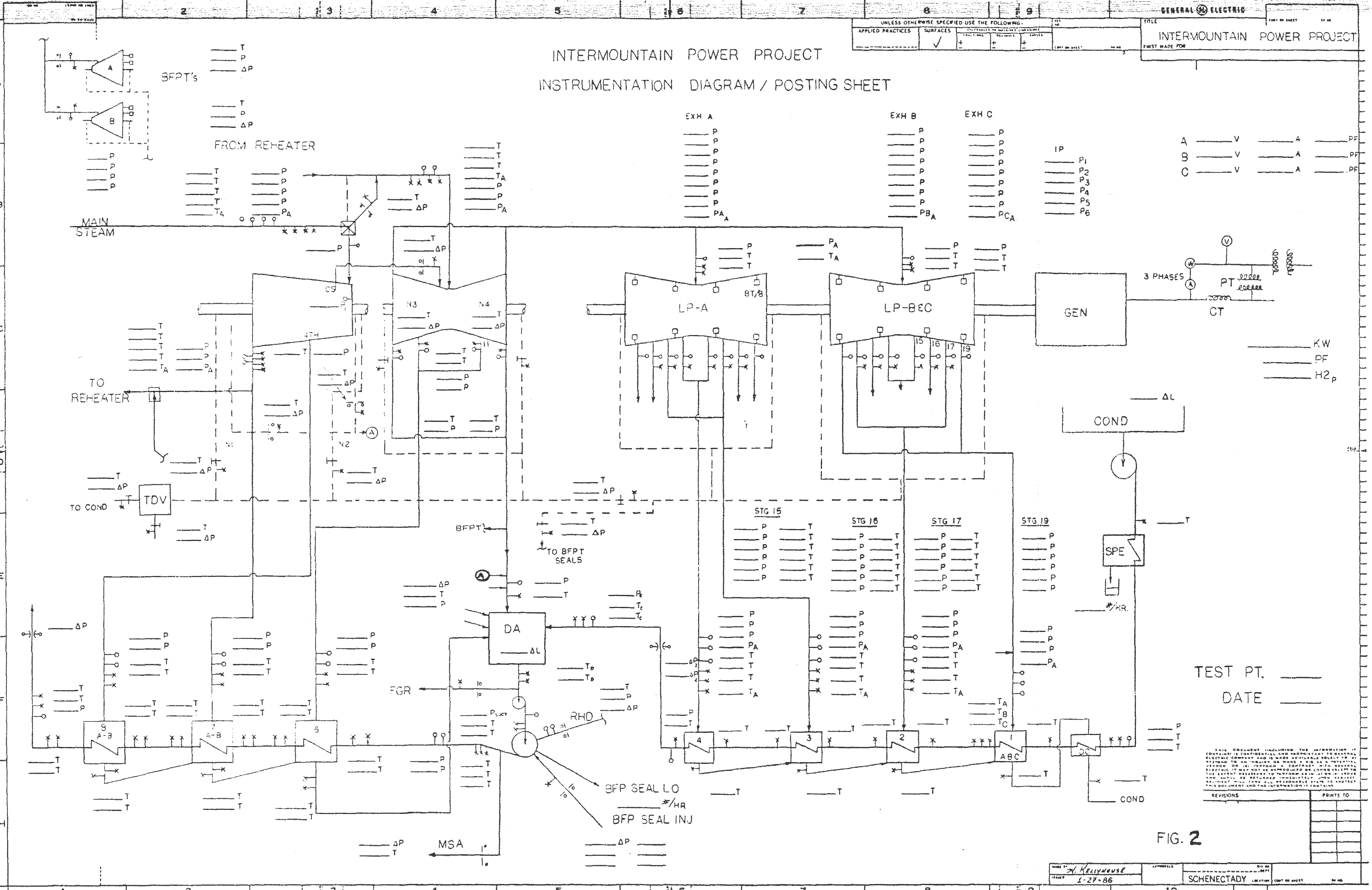
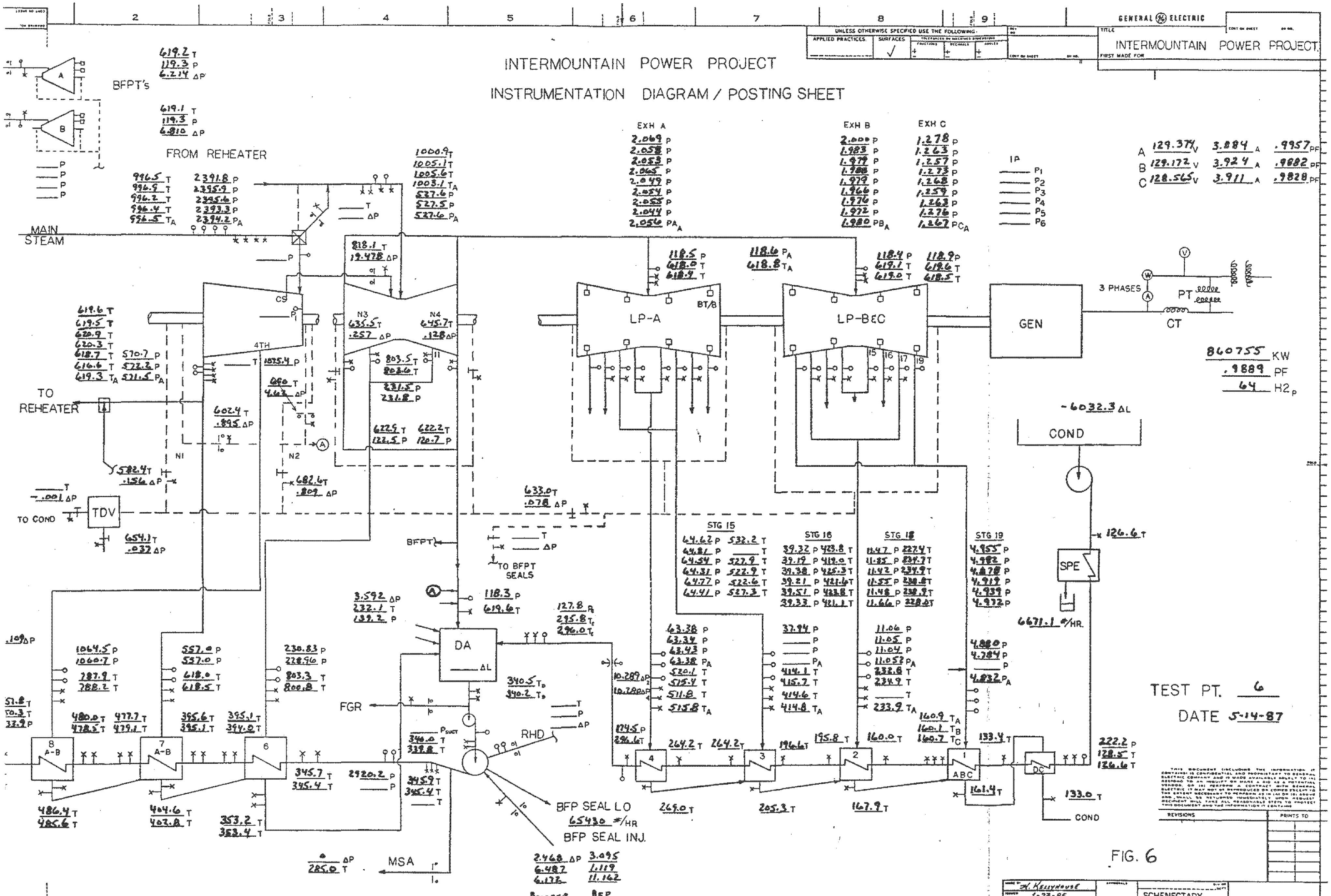


FIG. 2

INTERMOUNTAIN POWER PROJECT

SCHENECTADY

H. KELLYHOUSE 1-27-86



GENERAL ELECTRIC
INTERMOUNTAIN POWER PROJECT
INSTRUMENTATION DIAGRAM / POSTING SHEET
BFPT's
FROM REHEATER
MAIN STEAM
TO REHEATER
TO COND
TDV
EXH A
EXH B
EXH C
LP-A
LP-B&C
GEN
3 PHASES
PT
CT
860755 KW
.9889 PF
64 H2P
COND
SPE
6671.1 #/HR.
STG 15
STG 16
STG 18
STG 19
DA
FGR
RHD
MSA
BFP SEAL LO
65430 #/HR
BFP SEAL INJ.
TO BFPT SEALS
BFPT
TEST PT. 6
DATE 5-14-87
SCHENECTADY

FIG. 6

INTERMOUNTAIN POWER PROJECT
UNIT # 2
TEST CYCLE HEAT BALANCE
TEST POINT # 6

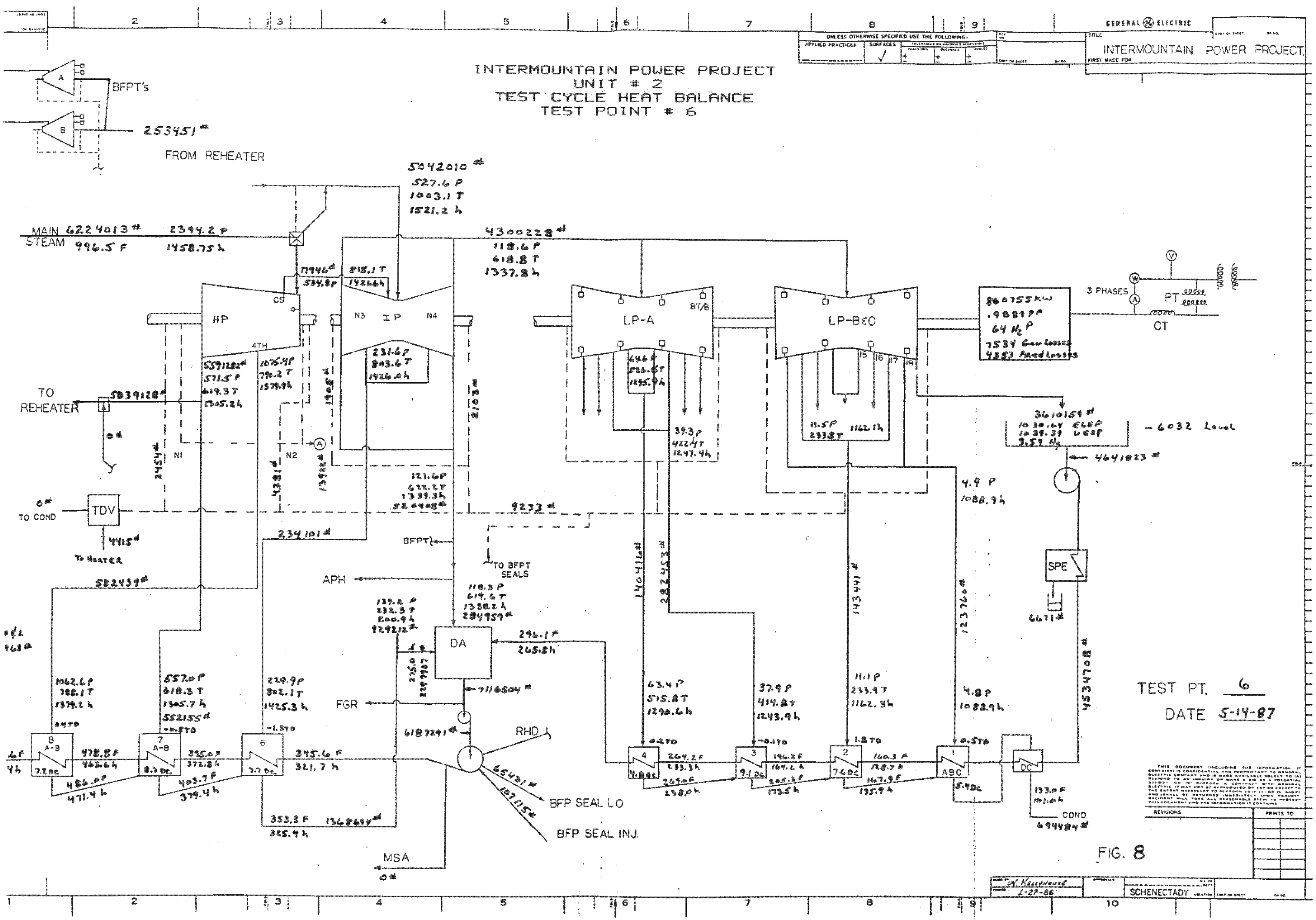
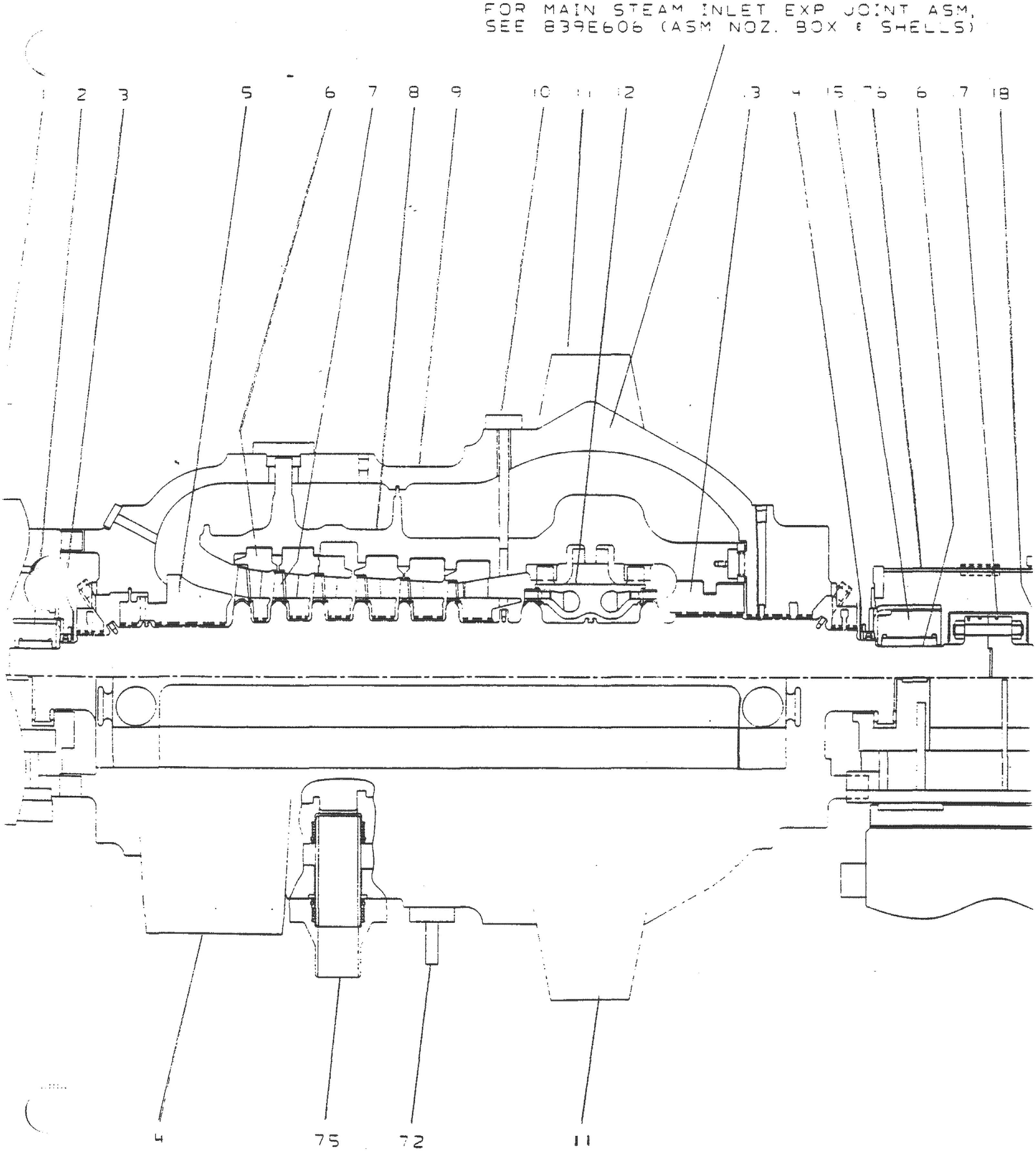


FIG. 8

IP14_004905

HP

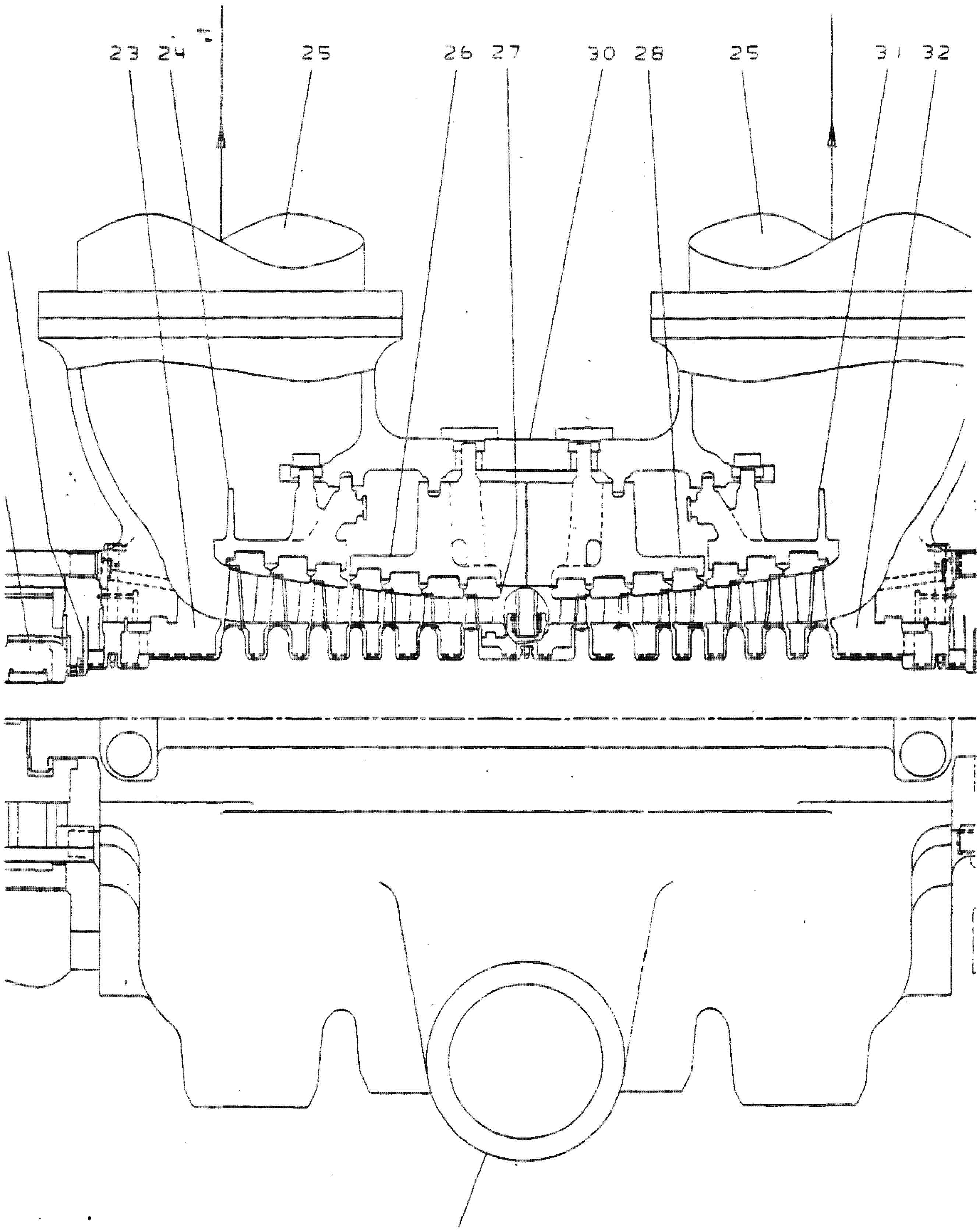


INTERMOUNTAIN POWER PROJECT
UNIT # 2
HIGH PRESSURE SECTION

FIG. 1A

IP14_004906

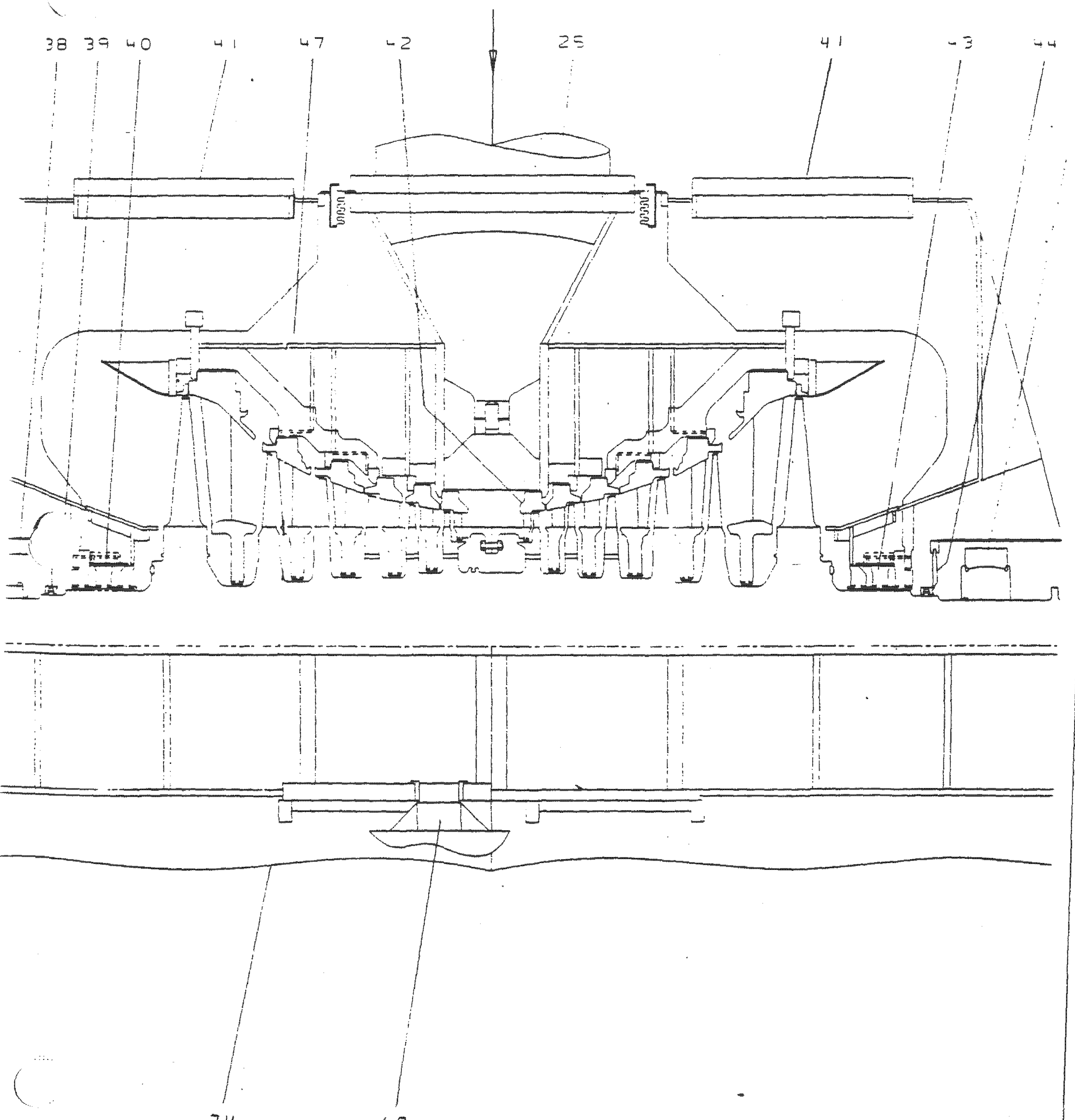
IP



INTERMOUNTAIN POWER PROJECT
UNIT # 2
INTERMEDIATE PRESSURE SECTION

FIG. 1B

LP



INTERMOUNTAIN POWER PROJECT
UNIT # 2
LOW PRESSURE SECTION
HOOD "A" DUPLICATE OF "B" AND "C"

FIG. 1C

IP14_004908

APPENDIX B

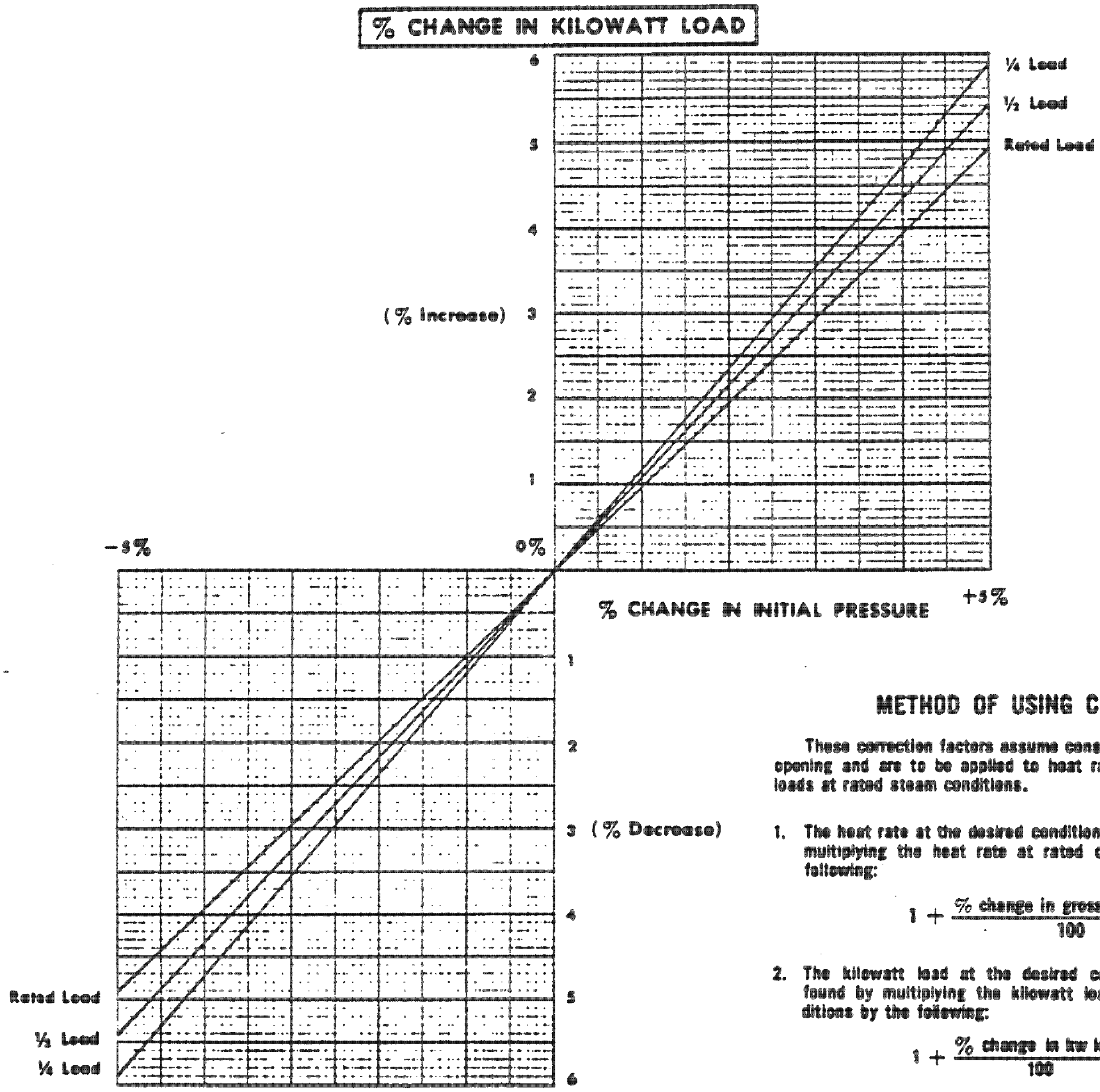
Correction Curves

Dwg. No.	Nomenclature	Page
GEZ 3614	Throttle Pressure Correction	B1
GEZ 3615	Throttle Temperature Correction	B2
GEZ 3617	Reheat Temperature Correction	B3
481 HP 475	Exhaust Pressure Correction	B4

Reheat Press Drop?

INITIAL PRESSURE CORRECTION FACTORS

FOR SINGLE REHEAT UNITS



METHOD OF USING CURVES

These correction factors assume constant control valve opening and are to be applied to heat rates and kilowatt loads at rated steam conditions.

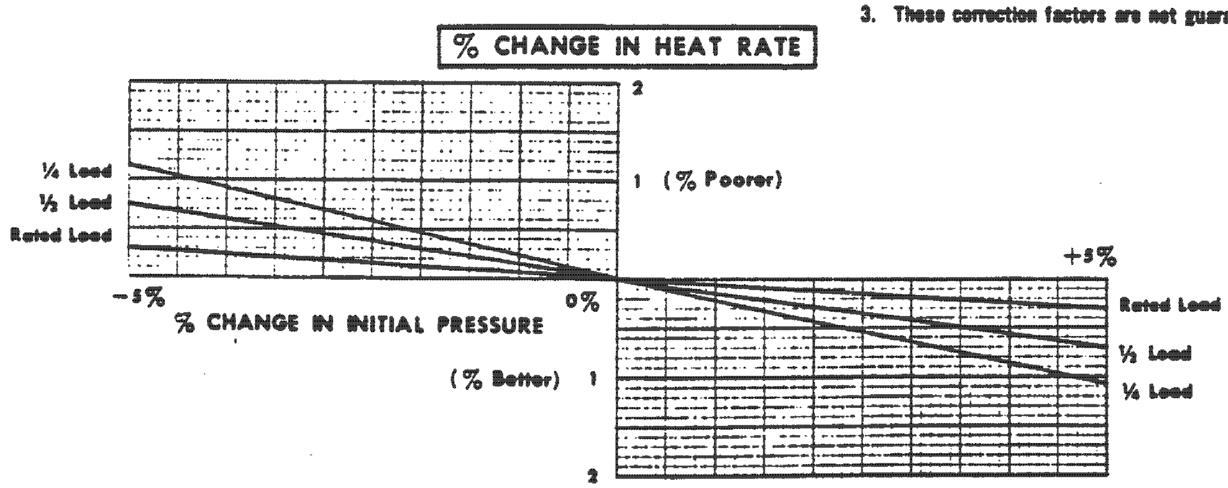
1. The heat rate at the desired condition can be found by multiplying the heat rate at rated conditions by the following:

$$1 + \frac{\%\ \text{change in gross heat rate}}{100}$$

2. The kilowatt load at the desired conditions can be found by multiplying the kilowatt load at rated conditions by the following:

$$1 + \frac{\%\ \text{change in kw load}}{100}$$

3. These correction factors are not guaranteed.

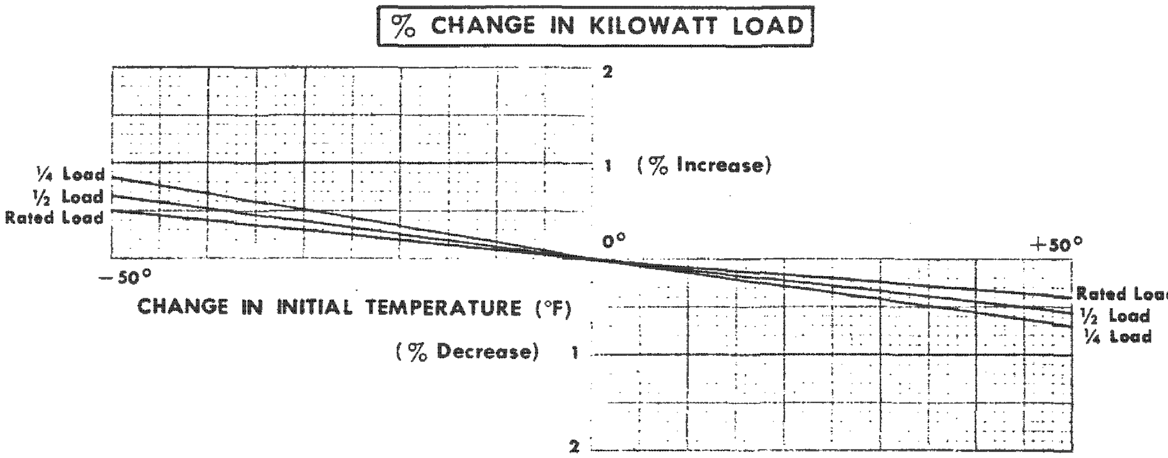


GEZ-3614
4-81 (2M)

GENERAL ELECTRIC

FIG. B1

INITIAL TEMPERATURE CORRECTION FACTORS
FOR SINGLE REHEAT—SUBCRITICAL PRESSURE UNITS



METHOD OF USING CURVES

These correction factors assume constant control valve opening and are to be applied to heat rates and kilowatt loads at rated steam conditions.

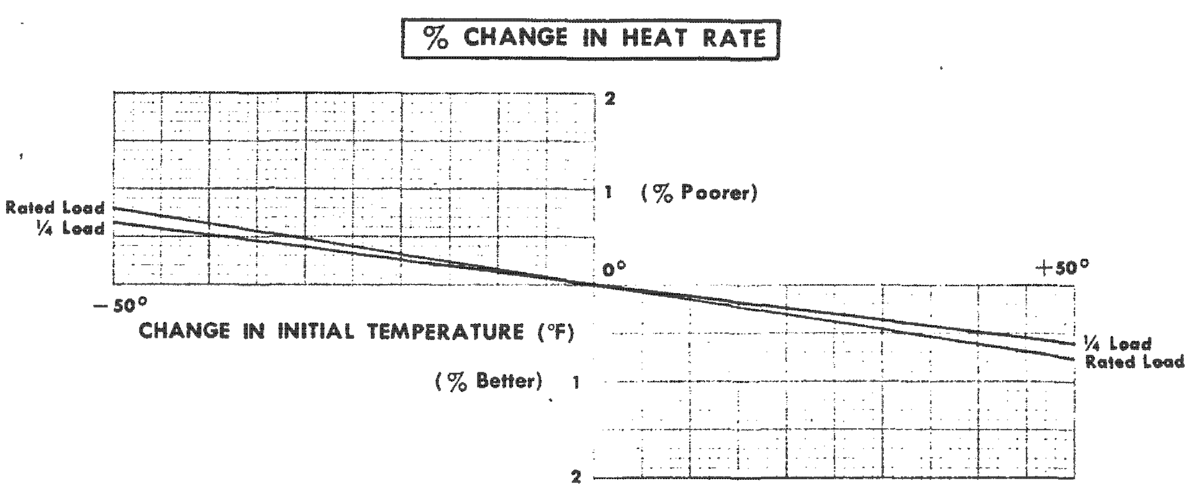
1. The heat rate at the desired condition can be found by multiplying the heat rate at rated conditions by the following:

$$1 + \frac{\%\text{ change in gross heat rate}}{100}$$

2. The kilowatt load at the desired conditions can be found by multiplying the kilowatt load at rated conditions by the following:

$$1 + \frac{\%\text{ change in kw load}}{100}$$

3. These correction factors are not guaranteed.



GEZ-3615
6-67 (2M)

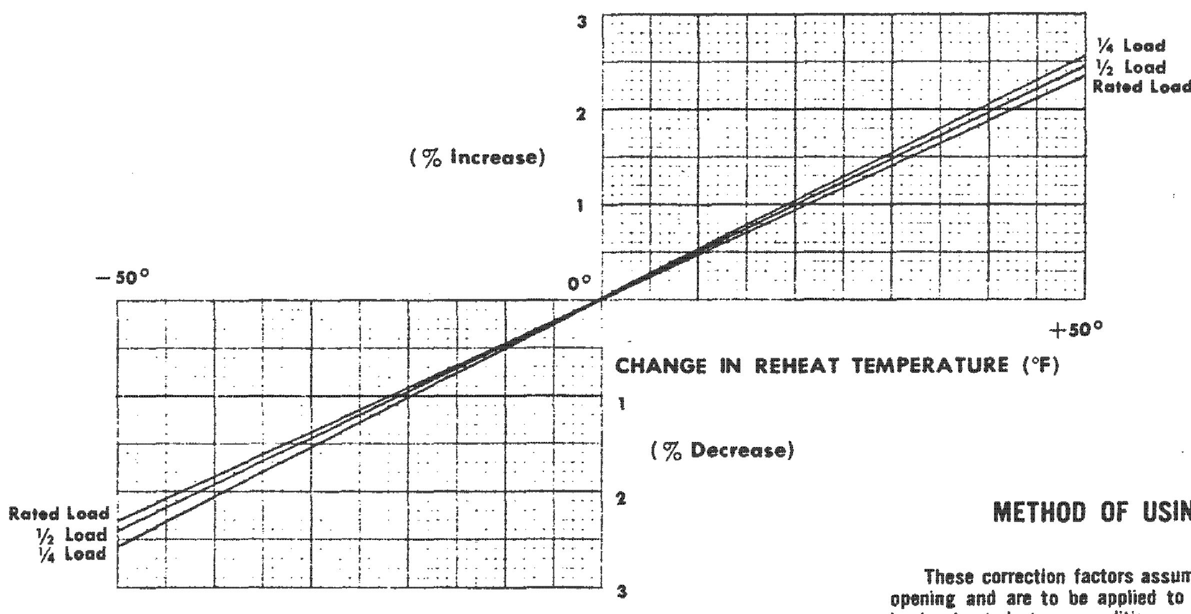
GENERAL ELECTRIC
FIG. B2

IP14_004911

REHEAT TEMPERATURE CORRECTION FACTORS

FOR SINGLE REHEAT UNITS

% CHANGE IN KILOWATT LOAD



METHOD OF USING CURVES

These correction factors assume constant control valve opening and are to be applied to heat rates and kilowatt loads at rated steam conditions.

1. The heat rate at the desired condition can be found by multiplying the heat rate at rated conditions by the following:

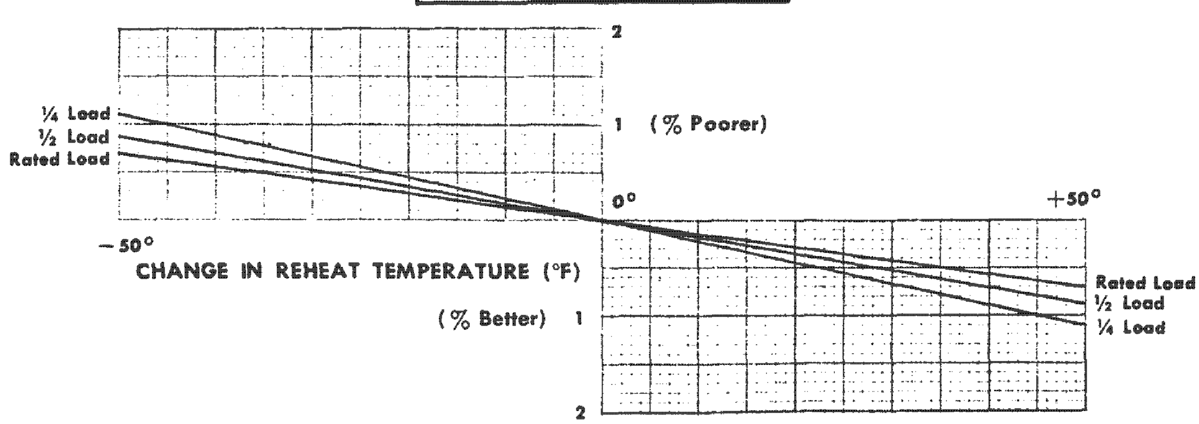
$$1 + \frac{\%\text{ change in gross heat rate}}{100}$$

2. The kilowatt load at the desired conditions can be found by multiplying the kilowatt load at rated conditions by the following:

$$1 + \frac{\%\text{ change in kw load}}{100}$$

3. These correction factors are not guaranteed.

% CHANGE IN HEAT RATE



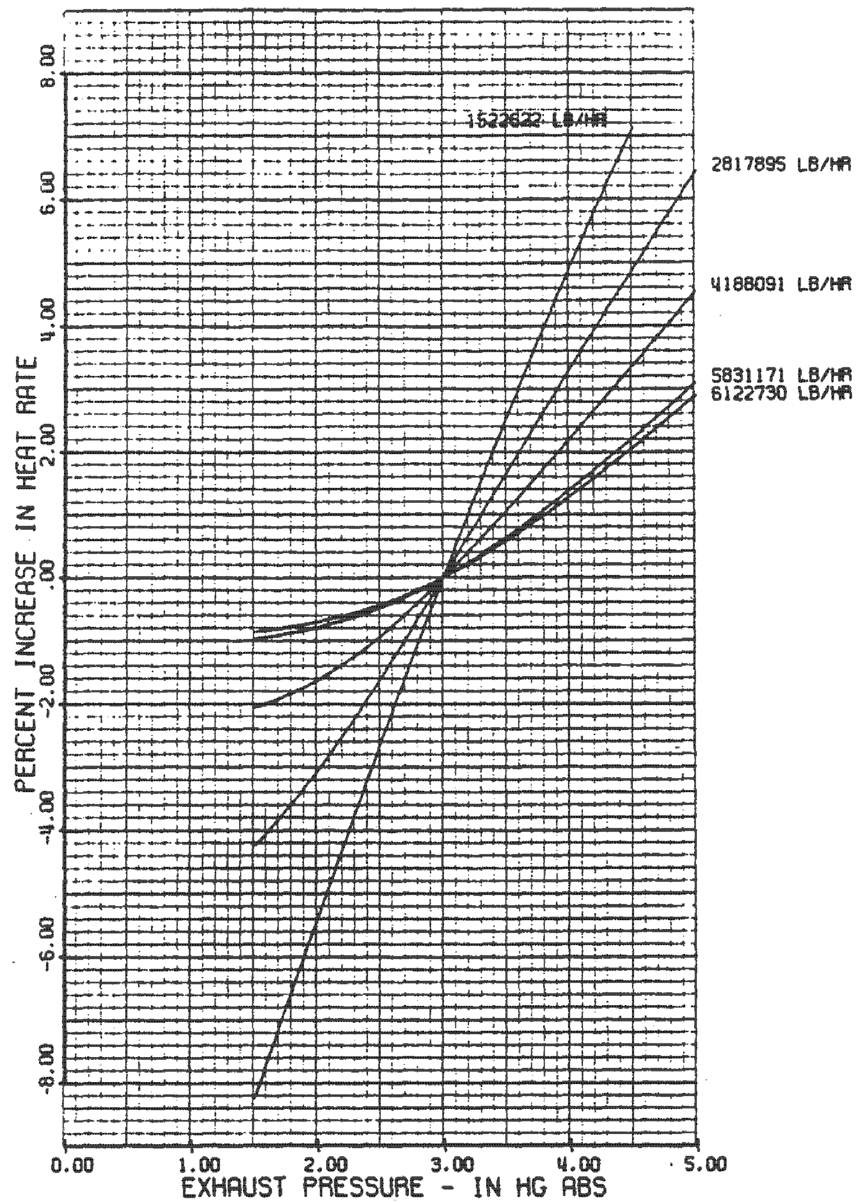
GEZ-3617
2-71 (2M)

GENERAL ELECTRIC

IP14_004912

EXHAUST PRESSURE CORRECTION FACTORS

820000 KW AT 1.66/ 2.24/ 2.99 IN HG ABS 1.00 PCT MU
TC6F-30.0 IN LSB 3600 RPM
2400 PSIA 1000/1000 T



METHOD OF USING CURVE

VALUES NEAR CURVES ARE FLOWS AT 2400 PSIA 1000 T
THESE CORRECTION FACTORS ASSUME CONSTANT CONTROL VALVE OPENING
APPLY CORRECTIONS TO HEAT RATE AND KW LOADS
AT 2.99/ 2.24/ 1.66 IN HG ABS AND 0.0 PCT MU.

THE PERCENT CHANGE IN KW LOAD FOR VARIOUS EXHAUST PRESSURES IS EQUAL TO
(MINUS PCT INCREASE IN HEAT RATE)100/(100 + PCT INCREASE IN HEAT RATE)

THESE CORRECTION FACTORS ARE NOT GUARANTEED

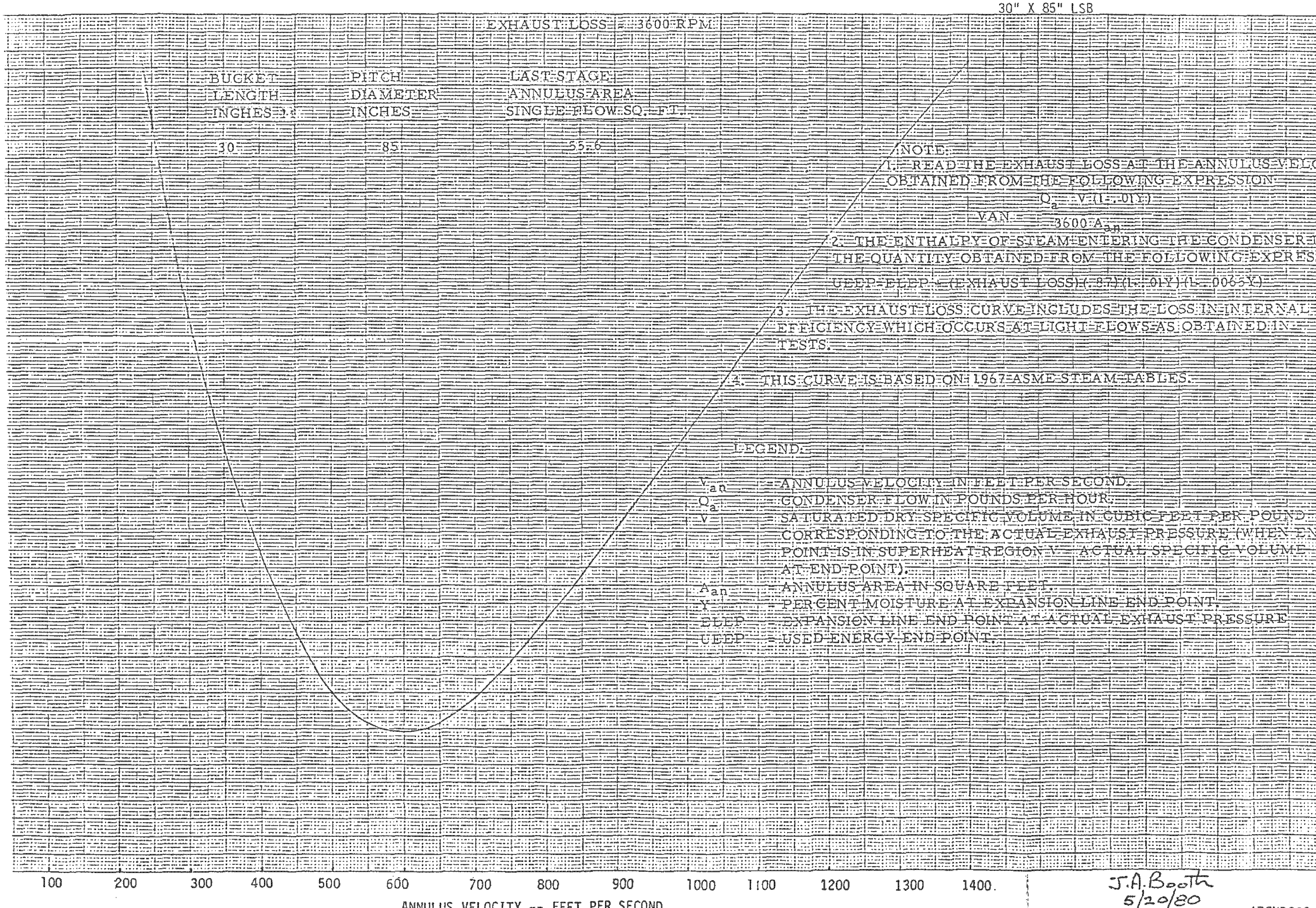
PRESSURES ALONG ABSCISSA ARE PRESSURES IN HOOD C

PRESSURE(IN HG ABS) FOR	HOOD C	HOOD B	HOOD A
	1.50	1.09	.78
	2.00	1.47	1.07
	2.50	1.85	1.36
	3.00	2.24	1.66
	3.50	2.63	1.96
	4.00	3.03	2.27
	4.50	3.42	2.58
	5.00	3.82	2.89

FIG. B4

481 HB 475

3600 RPM
30" X 85" LSB



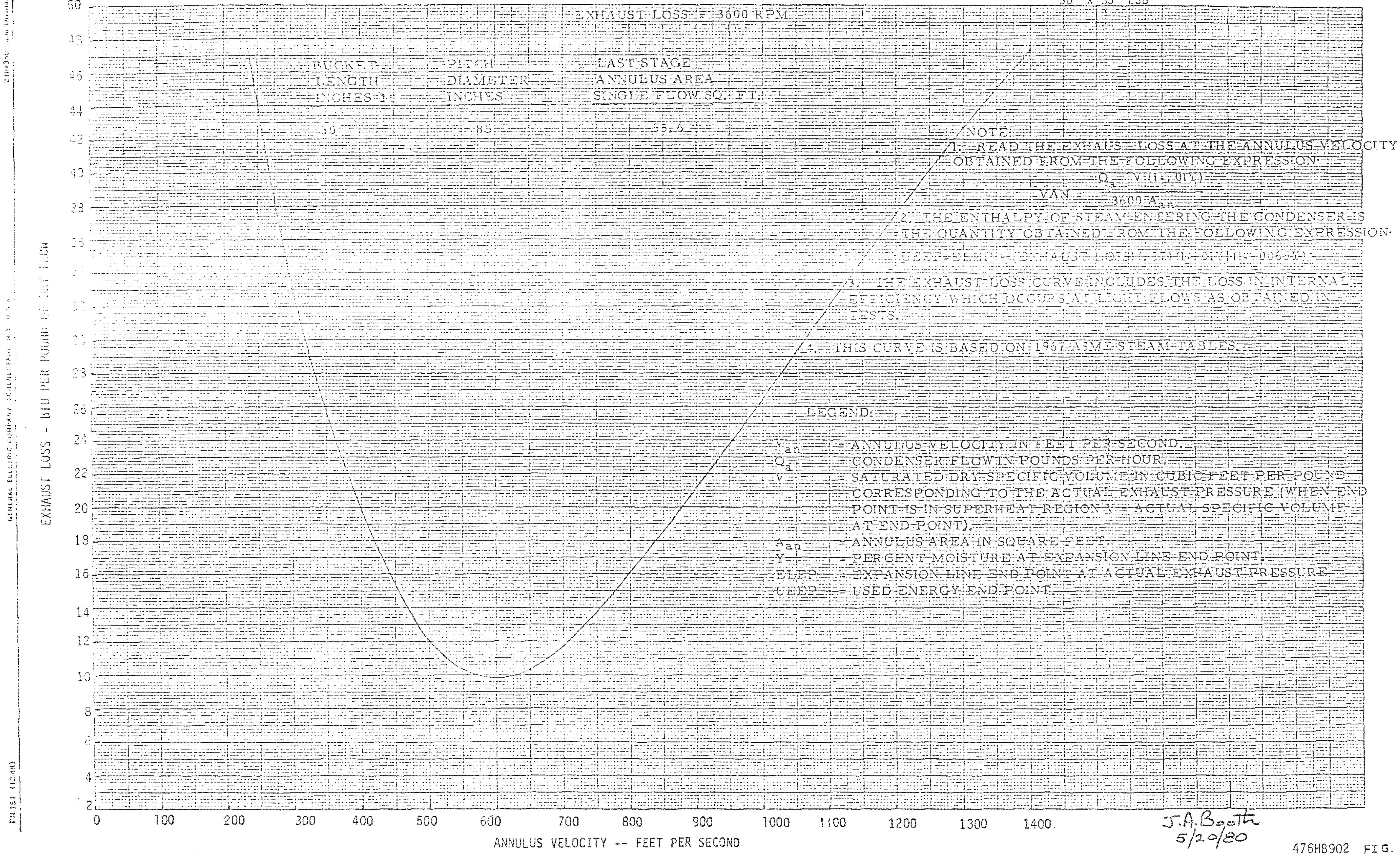
J.A. Booth
5/20/80

476HB902 FIG. 8A

IP14_004914

476HB902

3600 RPM
30" X 85" LSB



J.A. Booth
5/20/80

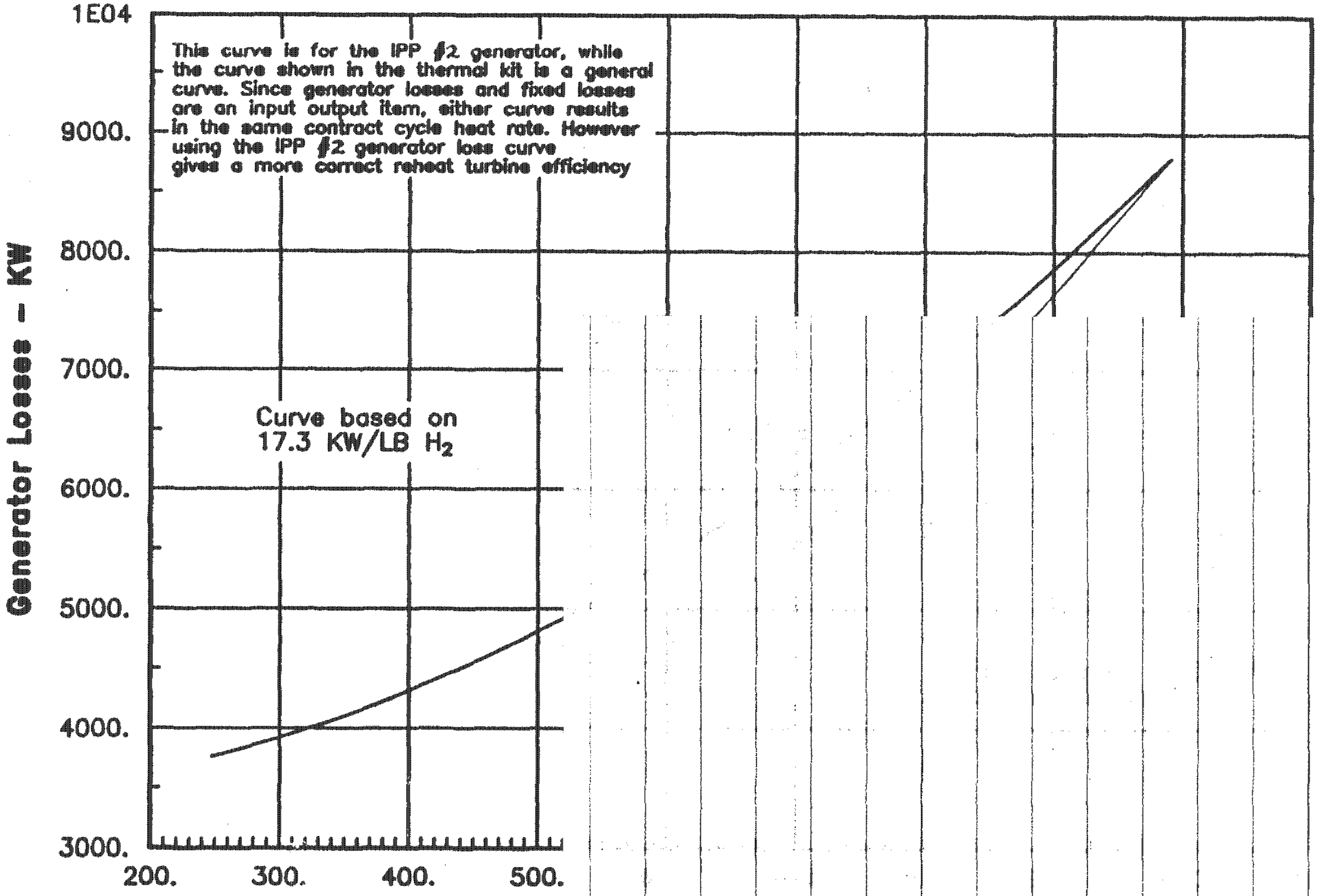
476HB902 FIG. 8A

IP14_004915

INTERMOUNTAIN POWER CO.

IPP No. 2

Generator Losses



Include:

Generator Correction Curves:
Power Factor
Hydrogen Press

Figure 7

FIG. 7

IP14_004916

INTERMOUNTAIN POWER CO.

IPP No. 2

Generator Losses

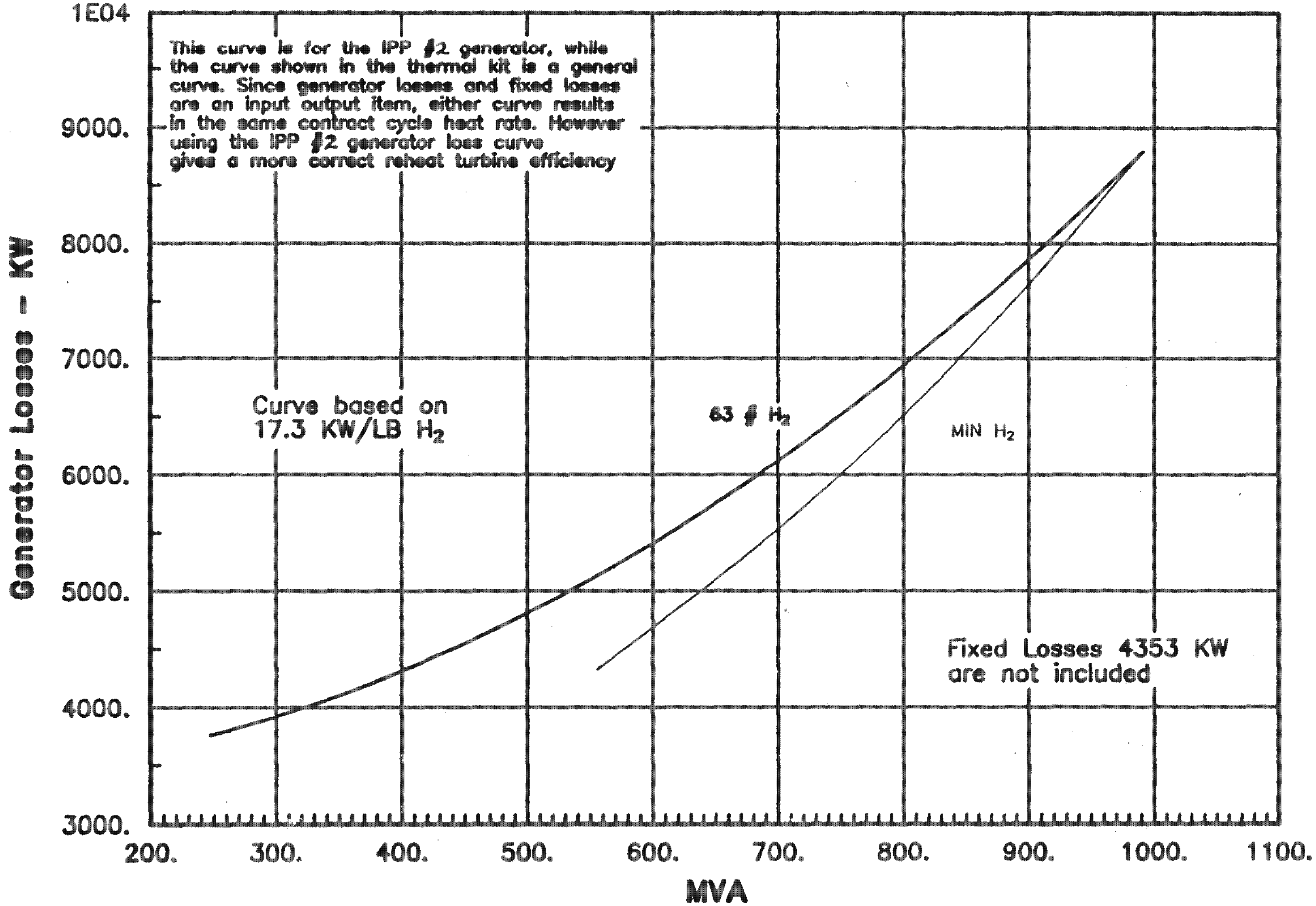


Figure 7

Fig. 7

IP14_004917

INTERMOUNTAIN POWER CO.

IPP No. 2

Generator Losses

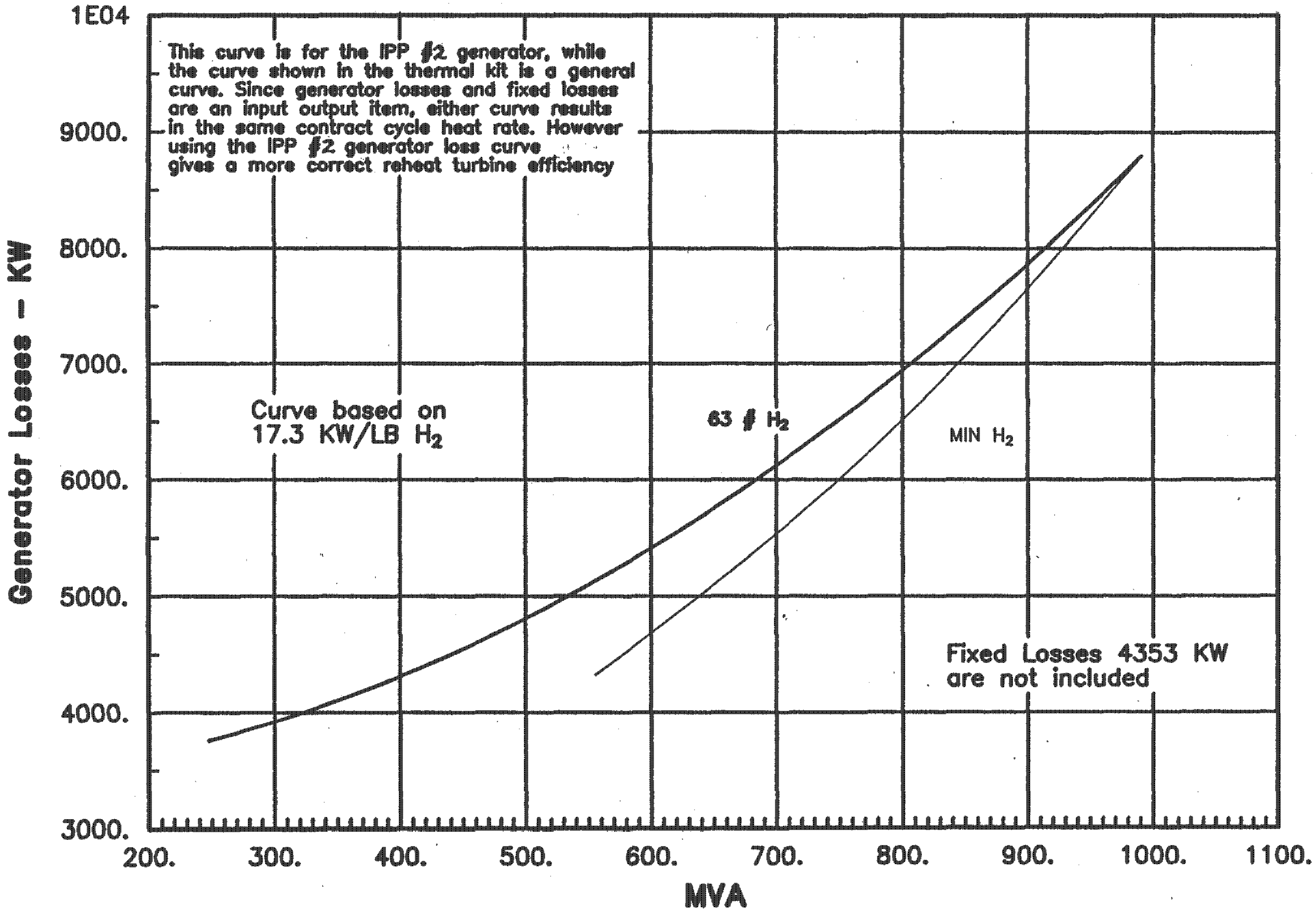


FIG. 7

Figure 7

IP14_004918

INTERMOUNTAIN POWER CO.

IPP No. 2

Condensate Flow Nozzle Calibration

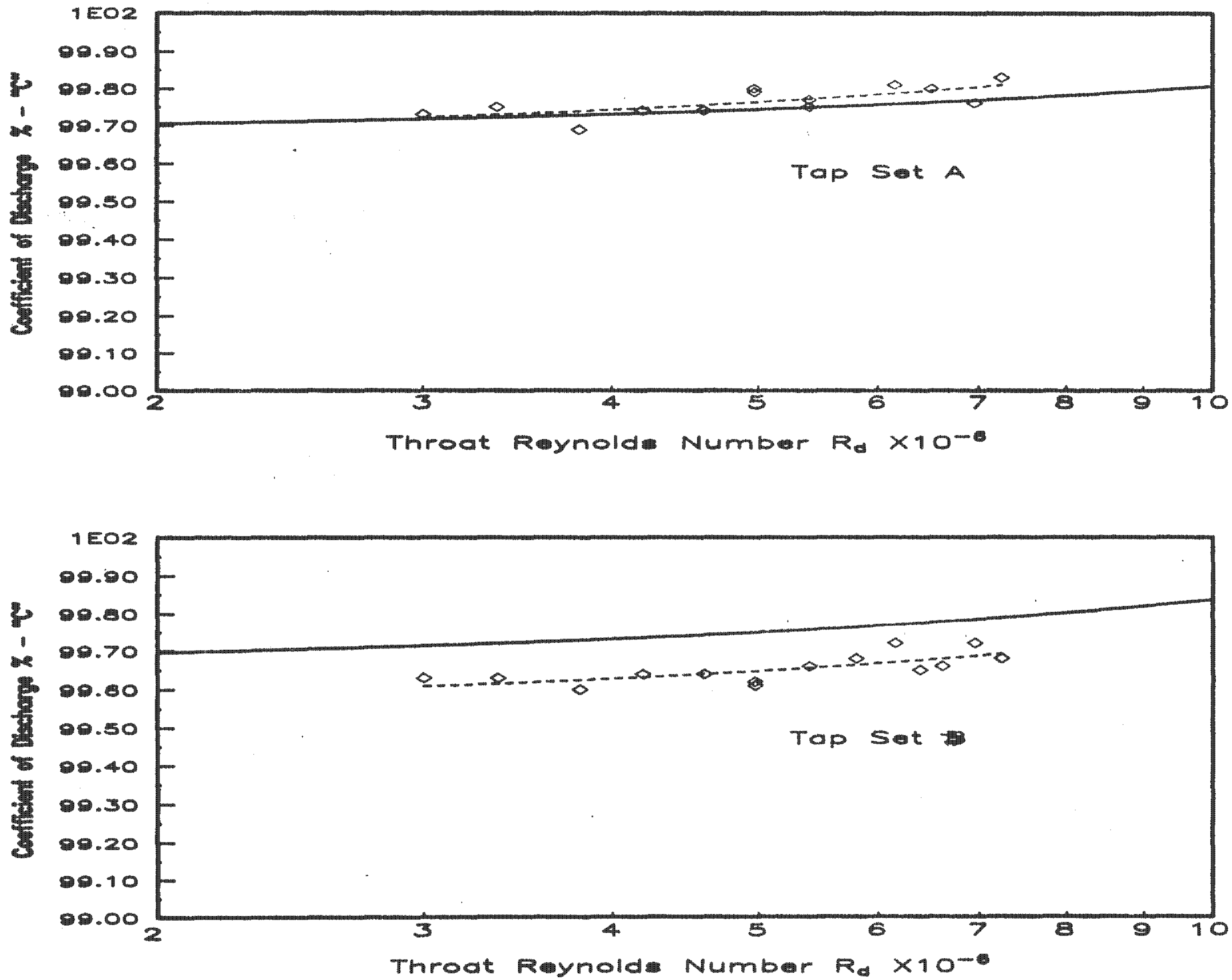


Figure 3

FIG. 3

IP14_004919

INTERMOUNTAIN POWER CO.

IPP No. 2

Condensate Flow Nozzle Calibration

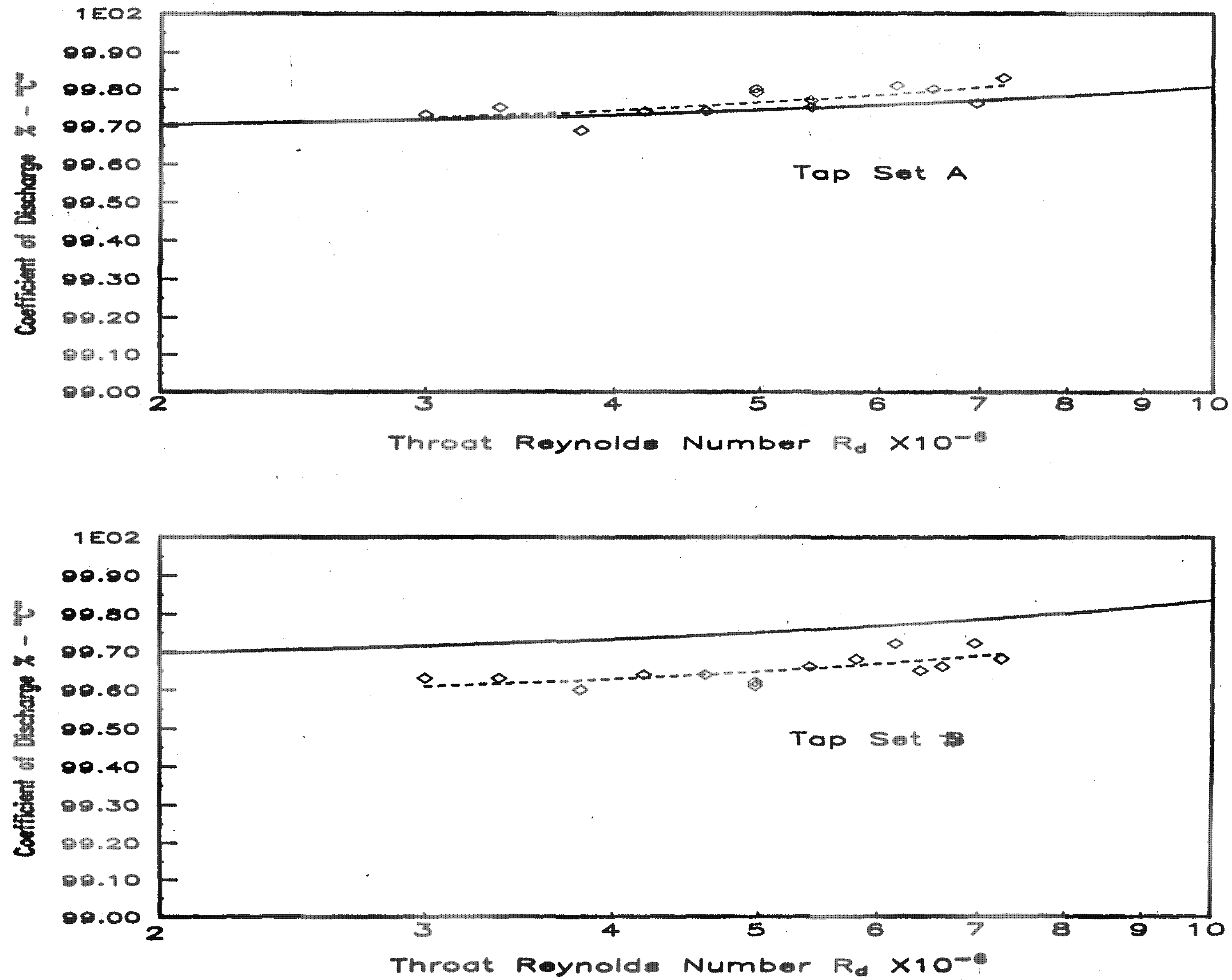


Figure 3

FIG. 3

APPENDIX D

Enthalpy Drop Efficiency

INTERMOUNTAIN POWER PROJECT
UNIT # 2
Enthalpy Drop Startup Test Data

TEST PT.	1	2	3
VALVE PT.	2nd	3rd	VWO
THROTTLE P (psia)	1495.37	1212.0	1216.05
THROTTLE T (deg F)	1004.29	1003.82	1003.35
CRH P (psia)	283.70	293.41	324.00
CRH T (deg F)	609.43	643.84	659.15
VC P (psia)	1481.18	1197.10	1205.95
1st STG P (psia)	818.18	895.83	996.95
P1/PT	.5471	.7390	.8198
HP (effy.)	81.835	87.10	88.71
T (corr.)	+.035	+.033	+.030
P (corr.)	-.24	-.16	-.16
HTR (corr.)	+.80	+.60	+.60
HP (effy) corrd.	82.43	87.573	89.18
HRH P (psia)	262.3	269.24	297.38
HRH T (deg F)	972.78	995.14	996.94
LPB P (psia)	59.926	59.860	66.269
LPB T (deg F)	599.44	612.72	614.82
IP (effy.)	91.569	91.74	91.613
HTR (corr.) **	+.40	+.40	+.40
IP (effy) corrd.	91.969	92.14	92.013
HTR (Out Serv.)	6AB,7AB,8AB	6B,7B,8AB	6B,7B,8AB
Barometric Pres. (Psia)	12.54	12.5	12.48

** Data from Unit # 1 showed a change in performance level of 0.40% points with # 6 heater in service.

FIG. D1

IP14_004922

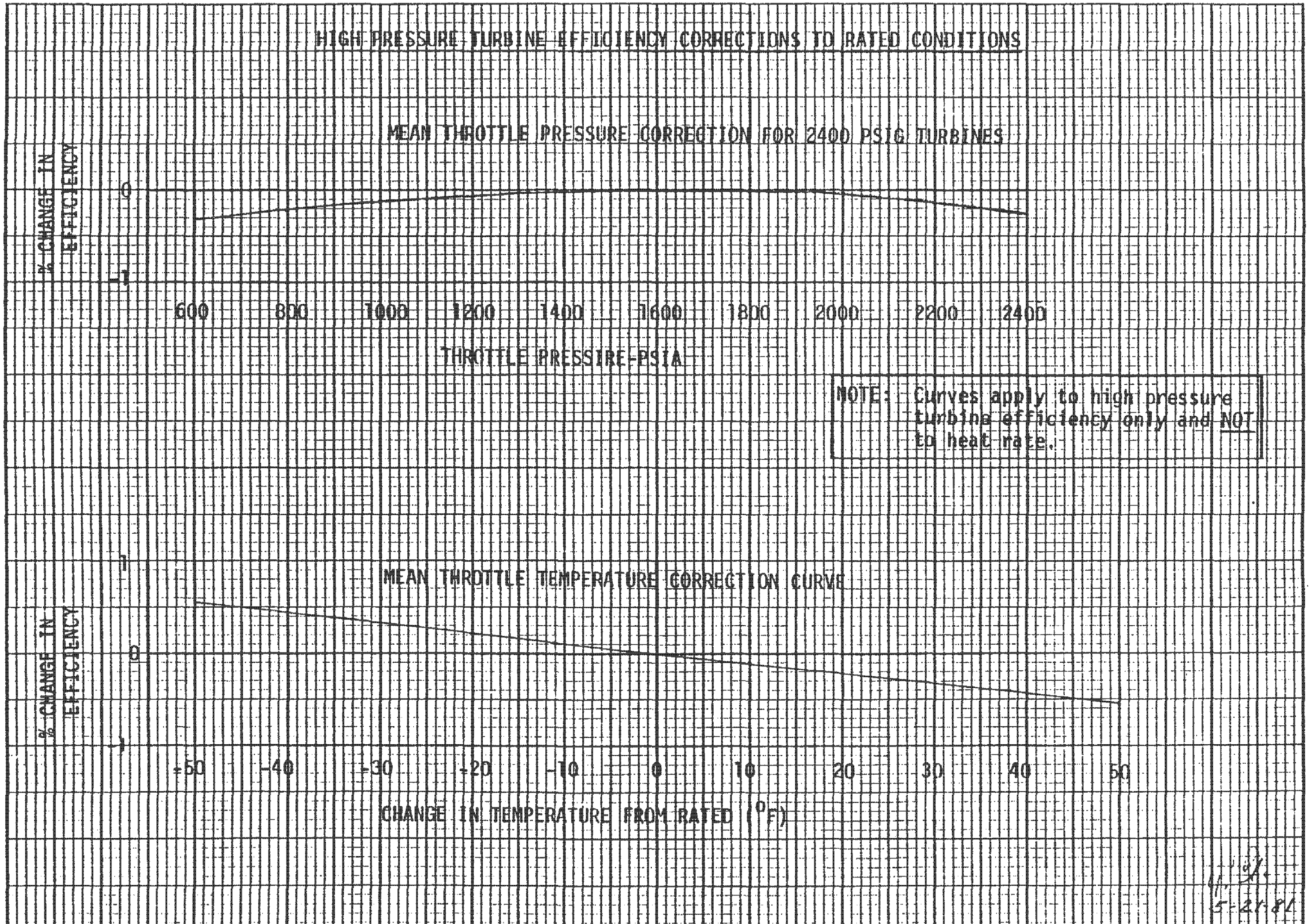


Fig. D2

IP14_004923

ENTHALPY DROP EFFICIENCY TEST

A turbine section efficiency can be measured if superheated steam conditions exist at both the inlet and exhaust of the section and the steam is thoroughly mixed so that the average temperature can be measured. The efficiency is defined as the energy used divided by the isentropic energy that is available. See Figure 1.

It is customary practice to measure the efficiencies of the high pressure turbine and intermediate pressure turbine of fossil fired reheat turbines with this method.

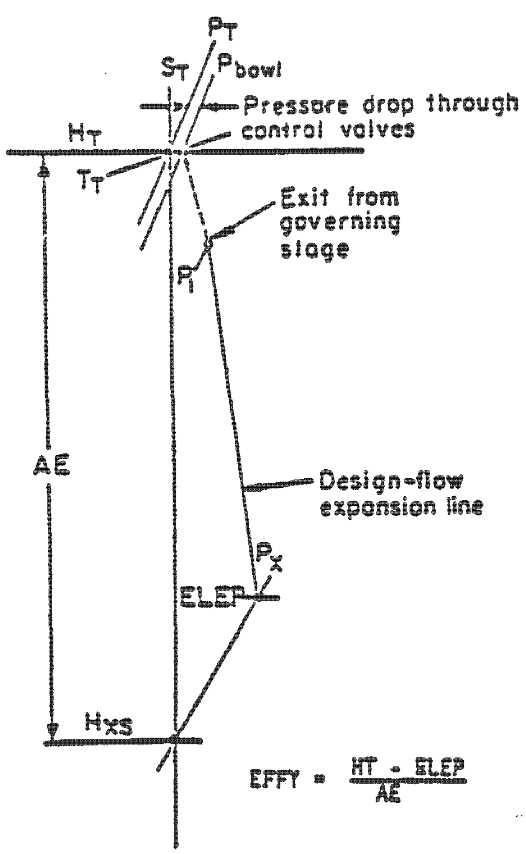


Fig. 1-a, Construction of expansion lines for non-condensing turbines with governing stage (HP TB)

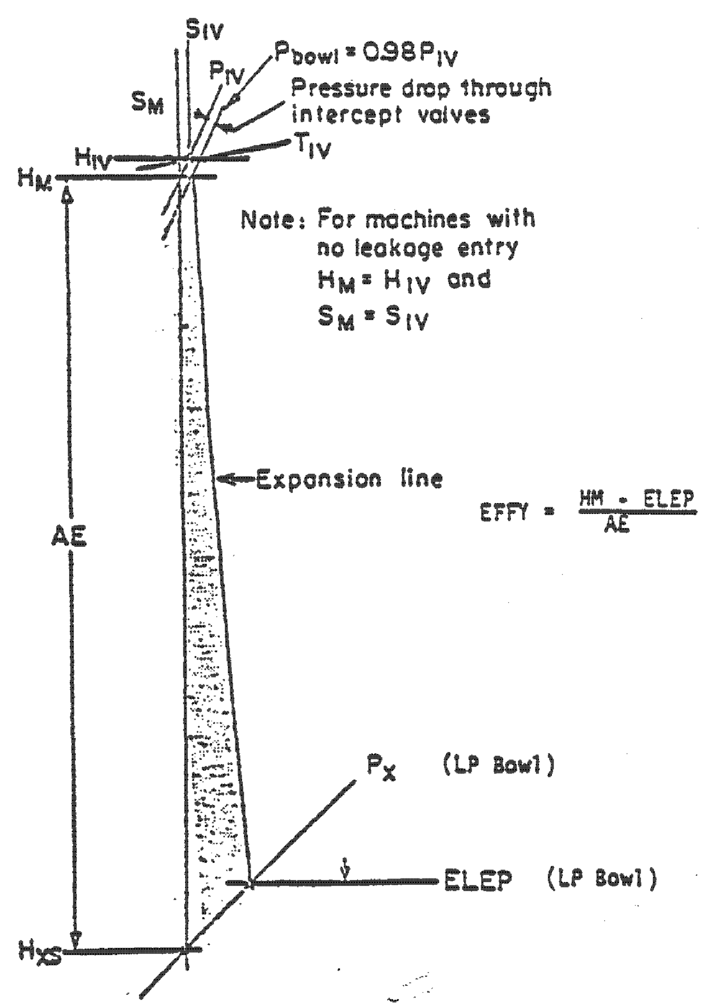


Fig. 1-b. Construction of expansion lines for IP turbines

To obtain an acceptable degree of accuracy and precision, the tests must be run by holding steam temperatures, pressures, and flows constant. Fluctuations of steam pressure should not exceed one percent of absolute pressure; temperature fluctuations should not exceed 5 F. Steam flows and load can be held constant by proper operation of the control mechanism. Care must be taken to insure that the turbine is up to operating temperature. After attaining steady conditions for at least half an hour, a test of one-hour duration with temperatures and pressures read at five-minute intervals should give satisfactory results.

The probable error of these section efficiencies is about 0.25 percent. This accuracy is based upon the ability to measure pressure within 0.1 percent at the throttle and reheat points, and 0.1 psi at the intermediate-pressure-section exhaust, and temperatures within 1/2 F. This probable error has been verified by comparing measured flow with calculated flow using enthalpy-drop efficiencies on the high-pressure section of cross-compound units.

Pressures above 35 psia should be measured with piston-type, dead-weight gages using calibrated weights.+ For a lower pressure a transducer may be used.

The design of a pressure tap should conform with the ASME Power Test Codes. Taps should be in a straight run of pipe, or at least not in or immediately adjacent to, a sharp turn, and should consist of a flush hole in the pipe wall. Care should be taken to remove any burrs.

The pressure connections should be located ahead of the turbine emergency stop valve, ahead of the intercept valve, in a cold reheat pipe near the high-pressure-section exhaust connection, and in the low-pressure-section bowl. If the intercept valve is directly connected to a reheat stop valve, then the pressure connection should be immediately ahead of the reheat stop valve. Figure locates these points of pressure measurements.

The pressure connection may be on the top, bottom, or side of a steam pipe provided certain precautions are taken to insure a definite water leg. If the connection is from the top or side of the steam pipe, the pressure-gage piping should be run horizontally and then dropped down. The same rule holds when the pressure gage is to be located above the pressure connection, i.e., there should be a downward loop in the gage line right near the pressure

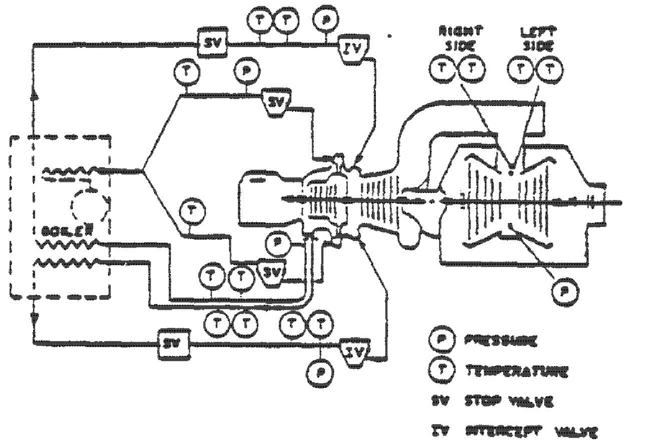


Fig. 2 Schematic arrangement of pressure and temperature instrument locations

connection. Pigtails are acceptable. These arrangements are shown in Fig. 3.

The pressure connection in the low-pressure-section bowl is located in the bottom of the bowl and is a 1/2-inch pipe, plugged at the end, and has several 1/4-inch diameter holes drilled through near the end of the pipe, Fig. 4.

For cross-compound turbines the intermediate-pressure-section exhaust pressure tap should be in the crossover pipe immediately downstream of the exhaust connection.

Temperatures should be measured with precision resistance thermometers or calibrated thermocouples and read on precision bridges and potentiometers.

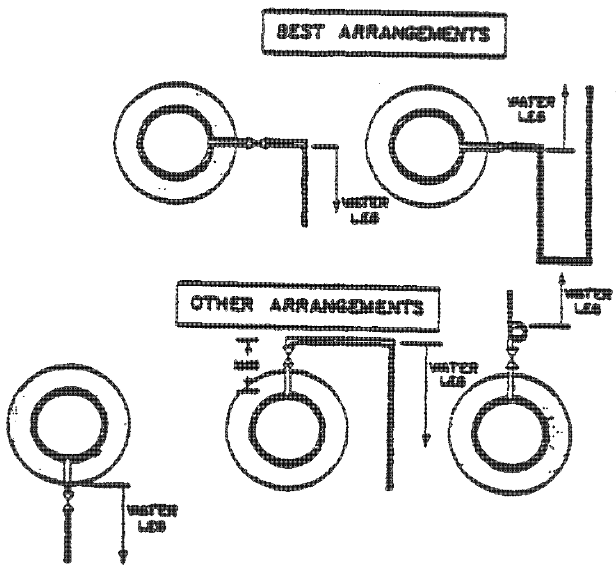


Fig. 3 Pressure-gage connections to steam pipes

+High accuracy transducers may be substituted if calibrated before and after the test.

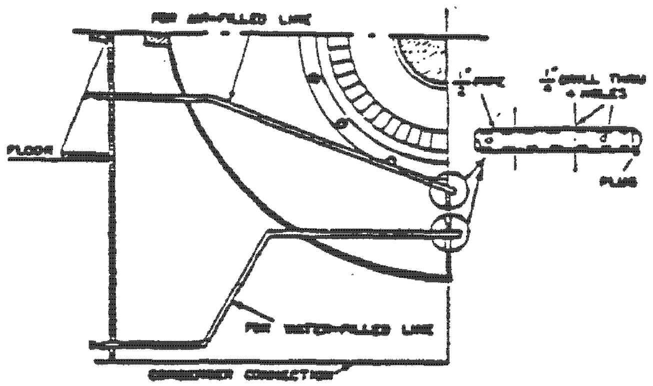


Fig. 4 Section through low-pressure turbine bowl showing pressure tap installation

It is recommended to duplicate temperature instrumentation. This will not only improve the accuracy of the data but will also detect a faulty temperature measurement. Placing the two thermowells in the top of a horizontal pipe so they are at about a 45-degree radial angle on each side of the vertical center line is a good scheme. The object is not to have two thermowells in line, Fig. 5.

When there are two separate steam leads from the boiler to the turbine, duplicate instrumentation in each lead is recommended, Fig. 2.

The length of the thermocouple well from the inner wall of pipe extending into the stream deserves attention in order to eliminate the error due to heat conduction up the thermocouple well wall. At the throttle the immersion should be > 2" and almost all standard installations are satisfactory. At the hot reheat point it is recommended that the immersion should be at least four inches if the outside diameter of the well is not greater than 1 1/2 inches. At the cold reheat point the immersion should be six inches. The location of the thermowells in the cold reheat line should be some distance downstream from the turbine and after at least one elbow to provide the proper mixing. The maximum distance from the turbine should not exceed 50 feet.

The thermocouple wells in the low-pressure-section bowl are made up of four 1/4-inch pipes which are securely fastened in the steam path. These probes should have radiation shields on their ends because the temperatures of all the wall surfaces in the bowl may be somewhat lower than the bowl steam temperature. A typical installation is shown in Fig. 6.

For cross-compound turbines,* two thermocouple wells should be in each crossover pipe located near the downstream end of the pipe. The immersion should be at least six inches if the outside diameter of the well is no greater than 1 1/2 inches.

Sample calculations of high-pressure and intermediate-pressure-section efficiencies are given in Table 1.

TABLE 1
SECTION EFFICIENCIES

High-pressure Section Efficiency

P_1 = 1815 psia	P_2 = 430 psia
T_1 = 1000 F	T_2 = 638.8 F
H_1 = 1480.3 Btu/lb	H_2 = 1326.8 Btu/lb

Entropy = 1.5739 Btu/lb F

Isentropic end point = 1298.4 Btu/lb

$$\text{Efficiency} = \frac{1480.3 - 1326.8}{1480.3 - 1298.4} \times 100 = 84.4 \text{ percent}$$

Intermediate-pressure Section Efficiency

P_1 = 402.0 psia	P_2 = 44.0 psia
T_1 = 1000 F	T_2 = 470.0 F
H_1 = 1522.4 Btu/lb	

H_{mix} Reheat Bowl =

$$\frac{{}^{*}710{,}290 \times 1522.4 + 21{,}300 \times 1450.8}{731{,}590} = 1520.3 \text{ Btu/lb}$$

* Flows estimated from design heat balances

Entropy P_1 and H_{mix} = 1.7600 Btu/lb F

Isentropic end point = 1244.9 Btu/lb

$$\text{Efficiency} = \frac{1520.3 - 1270.0}{1520.3 - 1244.9} \times 100 = 90.9 \text{ percent}$$

*or for tandem compound units with external pipes. In the near future all GE provisions will be in the crossover pipes.

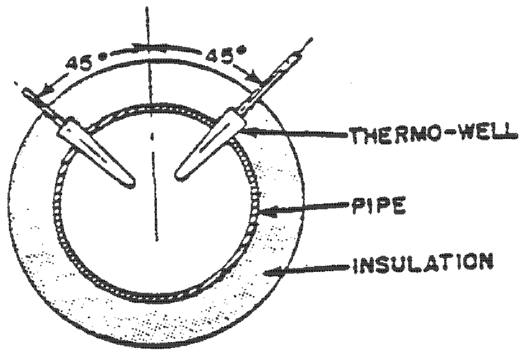


Fig. 5 Typical thermocouple-well arrangement

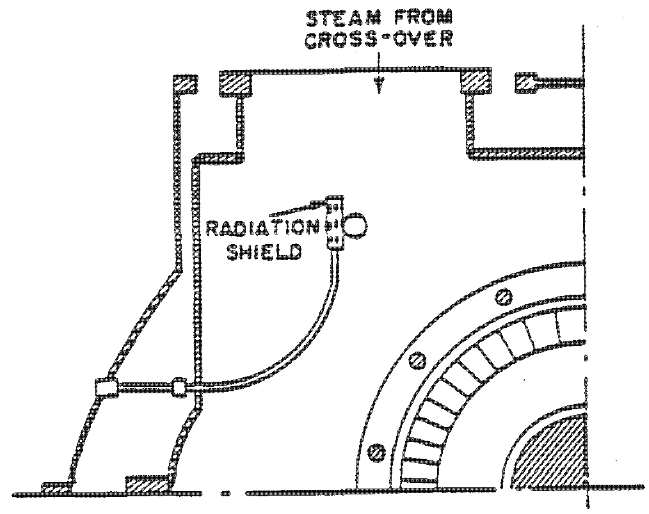


Fig. 6 Section through low-pressure turbine bowl showing thermocouple-well installation

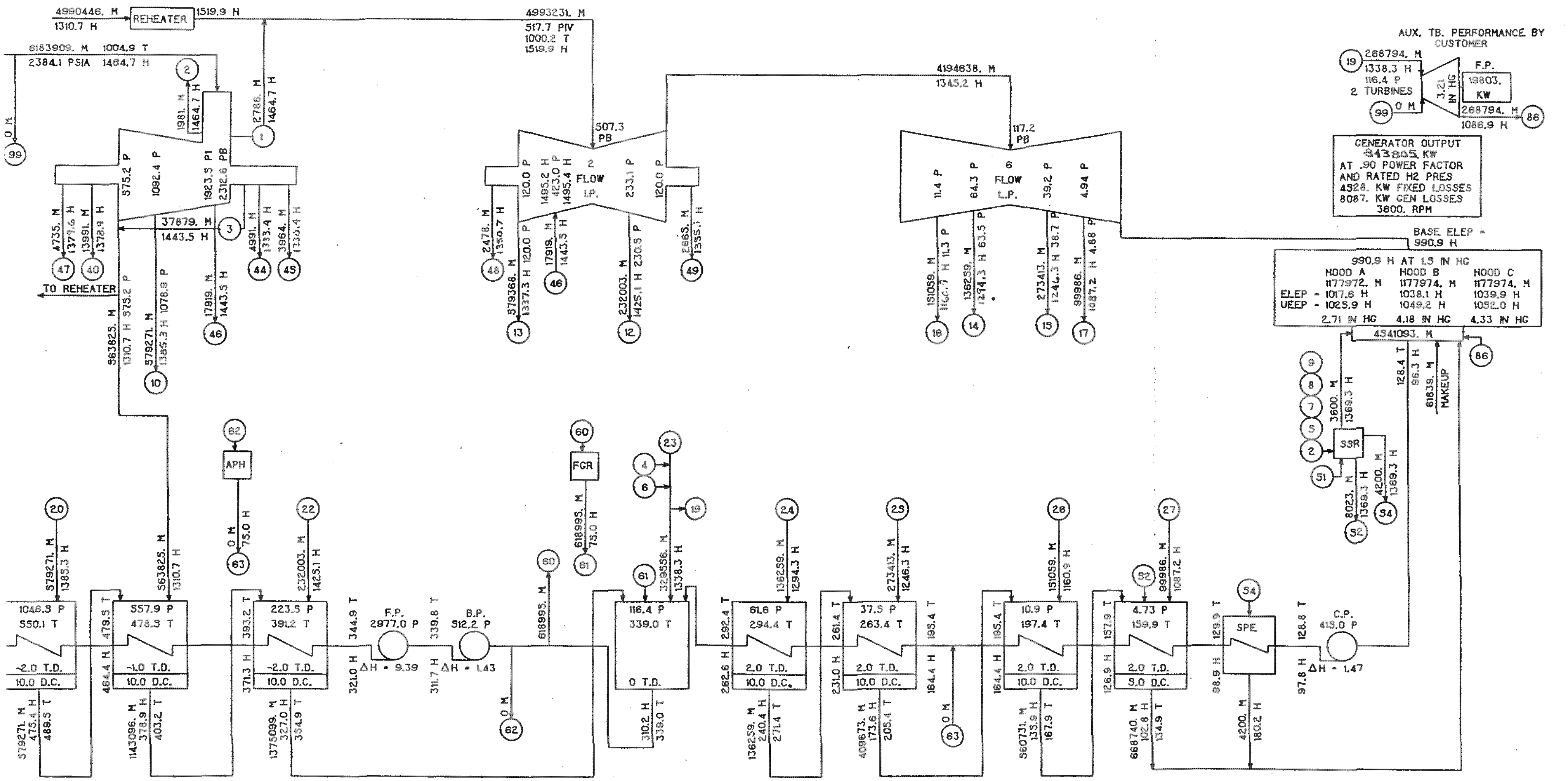
'G. 9A

CONTRACT CYCLE HEAT BALANCE TEST No. 2

TURBINE AND EXTRACTION ARRANGEMENT IS SCHEMATIC ONLY

CALCULATED DATA - NOT GUARANTEED

RATING FLOW IS 5979059. M AT INLET STEAM CONDITIONS OF 2412.2 PSIA AND 1000.0 T TO ASSURE THAT THE TURBINE WILL PASS THIS FLOW. CONSIDERING VARIATIONS IN FLOW COEFFICIENTS FROM EXPECTED VALUES. SHOP TOLERANCES ON DRAWING AREAS. ETC. WHICH MAY AFFECT THE FLOW. THE TURBINE IS BEING DESIGNED FOR A DESIGN FLOW (RATING FLOW PLUS 5.0 PERCENT) OF 6278012. M THE EQUIVALENT DESIGN FLOW AT 2384.1 PSIA AND 1004.9 T IS 6183893. M .
THE VALUE OF GENERATOR OUTPUT SHOWN ON THIS HEAT BALANCE IS AFTER ALL POWER FOR EXCITATION AND OTHER TURBINE-GENERATOR AUXILIARIES HAS BEEN DEDUCTED.



4541093 (1.47)
+6183.9 (716.4 - 546.8)

$$\text{POINT TE} = \frac{+6183909.\ (1464.7 - 548.8) + 4990446.\ (1519.9 - 1310.7)}{843805.} = 7985.9\ \frac{\text{BTU}}{\text{KW-HR}}$$

LEGEND - CALCULATIONS BASED ON 1967 ASME STEAM TABLES
M - FLOW-LB/HR
P - PRESSURE-PSIA
H - ENTHALPY-BTU/LB
T - TEMPERATURE-F DEGREES

9948T 1 0 1

KW / / IN HG ABS.
CONTRACT CYCLE HEAT BALANCE TEST NO.2
TC6F 30.0 IN. LSB 3600 RPM
2400.0 PSIA 1000. / 1000. T
GEN- 991000. KVA .90 PF LIQ

TP-2

FIG. 9A

5/14/87

RAL ELECTRIC COMPANY. SCHENECTADY N.Y.

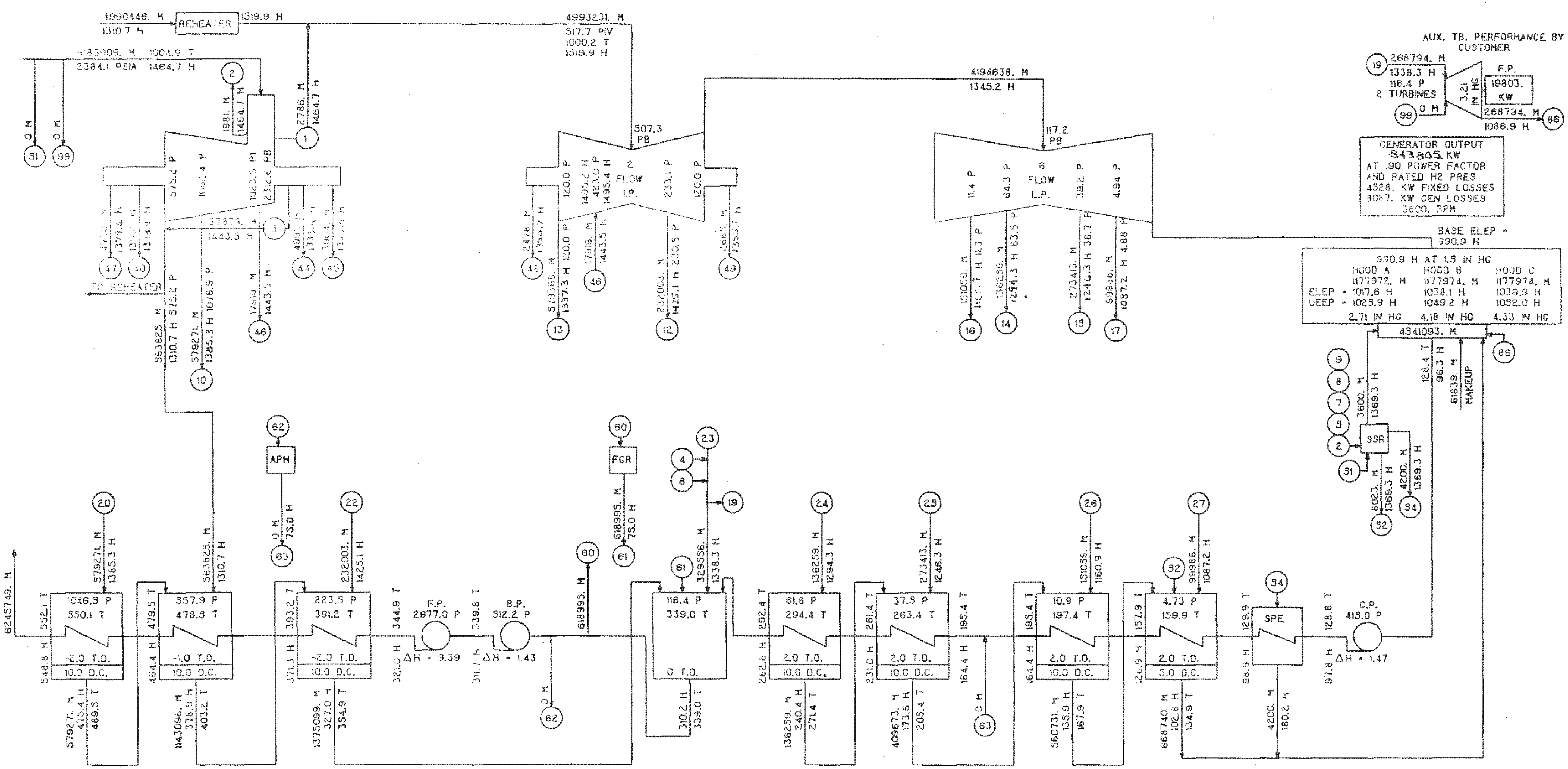
FIG. 9A

TURBINE AND EXTRACTION ARRANGEMENT IS SCHEMATIC ONLY

CALCULATED DATA - NOT GUARANTEED

CONTRACT CYCLE HEAT BALANCE TEST No. 2

RATING FLOW IS 5979039. M AT INLET STEAM CONDITIONS OF 2412.2 PSIA AND 1000.0 T TO ASSURE THAT THE TURBINE WILL PASS THIS FLOW. CONSIDERING VARIATIONS IN FLOW COEFFICIENTS FROM EXPECTED VALUES, SHOP TOLERANCES ON DRAWING AREAS, ETC. WHICH MAY AFFECT THE FLOW, THE TURBINE IS BEING DESIGNED FOR A DESIGN FLOW (RATING FLOW PLUS 5.0 PERCENT) OF 6278012. M THE EQUIVALENT DESIGN FLOW AT 2334.1 PSIA AND 1004.9 T IS 6183893. M .
THE VALUE OF GENERATOR OUTPUT SHOWN ON THIS HEAT BALANCE IS AFTER ALL POWER FOR EXCITATION AND OTHER TURBINE-GENERATOR AUXILIARIES HAS BEEN DEDUCTED.



4541093 (1.47)
+6183.9 (716.4 - 548.8)
+6183909. (1464.7 - 548.8)

VALVE BEST POINT NET HEAT RATE = $\dfrac{+4990446.\ (1519.9 - 1310.7)}{843805.}$ = 7985.9 $\dfrac{\text{BTU}}{\text{KW-HR}}$

LEGEND - CALCULATIONS BASED ON 1967 ASME STEAM TABLES
M - FLOW-LB/HR
P - PRESSURE-PSIA
H - ENTHALPY-BTU/LB
T - TEMPERATURE-F DEGREES

KW / / IN HG ABS.
CONTRACT CYCLE HEAT BALANCE TEST NO.2
TC6F 30.0 IN. LSB 3600 RPM
2400.0 PSIA 1000. / 1000. T
GEN- 991000. KVA .90 PF LIQ

9948T 1 0 1

Fig. 9A

5/14/87

GENERAL ELECTRIC COMPANY. SCHENECTADY N.Y.

TEST CYCLE HEAT BALANCE

VALVE POINT VWO	05/11/87	TEST POINT 02
INTERMOUNTAIN PWR PROJECT		UNIT #2
820000. KW	TC6F-30 IN LSB	TURBINE NO 270T151
2400. PSIG	1000./ 1000. F	2.300 IN HG ABS

CALCULATED USING ASME STEAM TABLES

COMBINED TURBINE-CYCLE PERFORMANCE

	TEST CONDITIONS	* RATED CONDITIONS
TOTAL LOAD	855960.	855119.
HEAT RATE	7855.9	7863.6
THROTTLE FLOW	6183909.	6285838.

TURBINE THERMAL PERFORMANCE

	HIGH PRESS TB		REHEAT TB		
			IP TB		LP TB
	THROTTLE	COLD RHT	INLET	EXH	EXH
PRESS	2384.10	566.00	521.40	118.50	3.739
TEMP	1004.90	625.10	999.59	617.20	122.95
ENTH	1464.67	1309.24	1519.47	1336.96	1032.15
ENTR	1.5364		1.7320	1.7471	
EFF	87.952		91.926		94.023

ABSCISSA PHPX/PT=0.2374 P1STSTG/PT=0.8045 VAN= 518.0

THRU FLOW PERFORMANCE OF CONDENSING SECTION SHAFT NO 1

	TOTAL TB ENERGY BALANCE		LP TB ENERGY BALANCE	
	RHT TB	LP TB	RHT TB	LP TB
AE	518.30	326.99		
H ELEP	1032.15		1032.15	
H UEEP	1040.68		1040.68	
EFF ELEP	94.02	93.22	94.02	93.22
EFF UEEP	92.38	90.61	92.38	90.61
VAN	518.03		518.03	

* LOAD AND HEAT RATE AT RATED POWER FACTOR AND H2 PRESS. FLOW AT RATED THROTTLE PRESS. OF 2412.2 PSIA AND TEMP. OF 1000 F.

T G L PERFORMANCE OF CONDENSING SECTION SHAFT NO 1

	TOTAL TB ENERGY BALANCE		LP TB ENERGY BALANCE	
	RHT TB	LP TB	RHT TB	LP TB
H ELEP	1034.72		1034.72	
H UEEP	1043.26		1043.26	
EFF ELEP	93.53	92.43	93.53	92.43
EFF UEEP	91.88	89.82	91.88	89.82
VAN	519.45		519.45	

STAGE FLOW FUNCTION

STG NO	SHELL PRESS	ONE VEL HD	PCT DELTA P	FLANGE PRESS	NOZ AREA	Q/AP H FLG	QFS	Q/AP H SHL
1	1918.00	0.	0.	0.	86.6	0.	6123308.	1007.1
4	1086.39	4.282	1.24	1072.90	157.4	848.4	5525420.	843.1
RH 1	521.40	0.	0.	0.	350.2	0.	5012929.	799.9
8	510.97	0.	0.	0.	350.2	0.	5030848.	819.0
11	233.00	0.811	1.11	230.40	711.2	790.7	4798678.	780.3
15	118.50	0.	0.	0.	807.6	0.	4277024.	1122.2
15	65.19	0.287	1.28	64.36	1414.8	1086.5	4137685.	1059.4
16	39.70	0.189	1.38	39.15	2021.4	1101.9	3856782.	1076.4
18	11.64	0.057	1.43	11.48	6018.0	1079.4	3715227.	1042.3
19	5.01	0.021	1.19	4.95	12096.0	1118.8	3594785.	1112.1

TL		PRESS	TEMP	ENTH	FLOW		

F E E D W A T E R   C Y C L E

TL		PRESS	TEMP	ENTH	FLOW		
						HEATER	8
4	FW IN	2728.40	478.50	463.22	6161067.4	CLOSED	
2	EXTR	1062.50	795.70	1383.93	579451.5	TD =	-0.1
3	DRAIN	1062.50	485.80	471.18	579451.5	DC =	7.3
						HEATER	7
7	FW IN	2728.40	394.50	372.31	6161067.4	CLOSED	
5	EXTR	553.10	624.30	1309.77	544362.4	TD =	-1.0
6	DRAIN	553.10	403.30	379.00	1123813.8	DC =	8.8
3	ENTRY	1062.50	485.80	471.18	579451.5		
						HEATER	6
10	FW IN	2826.00	345.10	321.01	6161067.4	CLOSED	
8	EXTR	228.70	799.80	1424.20	232170.1	TD =	-1.3
9	DRAIN	228.70	352.80	324.84	1355984.0	DC =	7.7
6	ENTRY	553.10	403.30	379.00	1123813.8		
						PUMP	
11	FW IN	0.	0.	0.	6147184.2		
86	SEAL INJ	0.	0.	0.	110957.1		
30	SEAL RET	0.	0.	0.	65681.0		
32	LEAKAGE	0.	0.	0.	0.		
24	EXTR	1500.00	200.00	171.47	0.		
35	FW OUT	2826.00	345.10	321.01	6192460.3		
						HEATER	5
13	FW IN	127.30	295.80	265.51	4513807.5	OPEN	
12	EXTR	118.30	617.90	1337.32	278489.7	STO =	797.0
111	DRAIN	118.30	340.10	311.36	7143589.9	SC =	0.1
109	ENTRY	0.	0.	278.04	2352389.8		
						HEATER	4
17	FW IN	173.80	264.00	233.10	4513807.8	CLOSED	
15	EXTR	63.26	514.70	1290.11	139338.8	TD =	0.4
16	DRAIN	63.26	268.60	237.57	139338.8	DC =	4.6
						HEATER	3
20	FW IN	173.80	196.10	164.54	4513807.8	CLOSED	
18	EXTR	38.23	413.70	1243.33	280903.0	TD =	0.5
19	DRAIN	38.23	205.20	173.37	420241.8	DC =	9.1
16	ENTRY	63.26	268.60	237.57	139338.8		
						HEATER	2
23	FW IN	173.80	160.50	128.86	4513807.8	CLOSED	
21	EXTR	11.04	233.50	1162.08	141555.3	TD =	1.8
22	DRAIN	11.04	167.90	135.88	561797.2	DC =	7.4
19	ENTRY	38.23	205.20	173.37	420241.8		

TL.		PRESS	TEMP	ENTH	FLOW		
						STM SEAL REG	
88	FLOW TO	0.	0.	0.	4149.8	CALCULATED	
70	TDV	5.11	660.40	1365.02	4149.8	TO HEATER	
68	TDV	2.21	470.00	1274.35	0.	TO CONDENSER	
	NOT CODED FOR MU		MEAS TOTAL FLOW =		0.		
						HEATER	1
26	FW IN	222.10	128.70	97.21	4513807.8	CLOSED	
25	EXTR	4.86	0.	1087.61	120442.1	TD =	0.6
123	DRAIN	4.86	134.20	102.16	686389.1	DC =	5.5
22	ENTRY	11.04	167.90	135.88	561797.2		
70	ENTRY	5.11	660.40	1365.02	4149.8		
						PUMP	
33	FW IN	0.	0.	0.	4624764.8		
87	LEAKAGE	0.	0.	0.	0.		
27	FW OUT	0.	0.	0.	4624764.8		
						FW TO BOILER	
1	FW IN	2728.40	552.10	549.07	6161067.4	S+L =	-8551.

T U R B I N E   E X P A N S I O N

						MAIN STEAM LINE	
71	EXIT	0.	0.	1464.67	0.		
36	THROTTLE	2384.10	1004.90	1464.67	6183909.3		
						VALVE STEM LKG	
						SQRT P/V =	85.583
37	LO NO 1	521.60	897.90	1464.67	2772.2	C =	55.714
						SQRT P/V =	18.640
38	LO NO 2	0.	0.	0.	1996.0	C =	107.081
						EXP TO STG	1
40	SHELL	1918.00	942.33	1440.06	6123307.6		
112	EXTR	0.	0.	1440.06	55833.4		
						PACKING NO	2
						SQRT P/V =	.115E 19
42	LO NO 1	123.17	700.00	1378.36	13574.6	C =	0.000
						SQRT P/V =	4.718
43	LO NO 2	17.14	690.50	1379.04	4273.7	C =	1030.390
						SQRT P/V =	0.655
100	LO NO 3	0.	0.	0.	587.4	C =	1769.447

TL	PRESS	TEMP	ENTH	FLOW	
					EXP TO STG 4
41 SHELL	1086.39	0.	1384.71	5525420.4	
79 EXTR	1072.90	797.80	1384.71	579451.5	
					PACKING NO 1
					SQRT P/V = 23.281
46 LO NO 1	121.87	609.30	1332.80	4789.9	C = 378.653
					SQRT P/V = 4.874
47 LO NO 2	17.02	589.20	1329.88	3438.1	C = 825.981
					SQRT P/V = 0.682
100 LO NO 3	0.	0.	0.	587.4	C = 1769.447
					EXPAND TO EXHAUST
49 EXH	566.00	625.10	1309.24	5554519.3	
80 EXTR	566.00	625.10	1309.24	544362.4	
50 TO RHT	566.00	625.10	1309.24	5010156.9	
					REHEATER 1
BEFORE LO	0.08	0.	1519.83	0.	
37 ENTRY					
84 AFTER LO	521.40	1000.20	1519.80	5012929.1	PCTDP = 7.880
					EXPAND TO BOWL
51 ENTRY	510.97	999.02	1519.47	5030848.4	
125 ENTRY	529.52	827.00	1426.65	17919.2	
					EXP TO STG 11
52 SHELL	233.00	0.	1414.79	4798678.3	
53 EXTR	230.40	801.20	1424.85	232170.1	
					PACKING NO 3
					SQRT P/V = 4.719
57 LO NO 1	16.99	634.30	1351.68	1919.2	C = 1102.299
					SQRT P/V = 0.666
58 LO NO 2	17.00	643.40	1356.09	2108.0	C = 4926.706
					SQRT P/V = 0.664
100 LO NO 3	0.	0.	0.	587.4	C = 1769.447
					SQRT P/V = 0.
100 LO NO 4	0.	0.	0.	587.4	C = 1769.447

TL	PRESS	TEMP	ENTH	FLOW	
					EXPAND TO EXHAUST
56 EXH	118.50	617.20	1336.96	4277024.0	
55 EXTR	121.40	620.20	1338.28	516452.4	
					EXPAND TO BOWL
59 ENTRY	118.50	617.20	1336.96	4277024.0	
					EXP TO STG 15
61 SHELL	65.19	0.	1277.73	4137685.2	
60 EXTR	64.36	525.30	1295.23	139338.8	
					EXP TO STG 16
63 SHELL	39.70	0.	1233.19	3856782.2	
62 EXTR	39.15	421.30	1246.91	280903.0	
					EXP TO STG 18
65 SHELL	11.64	0.	1141.41	3715226.8	
64 EXTR	11.48	233.40	1161.88	141555.3	
					EXP TO STG 19
107 SHELL	5.01	0.	1088.57	3594784.7	
106 EXTR	4.95	0.	1087.61	120442.1	

TL	PRESS	TEMP	ENTH	FLOW	
					CONDENSER
					SHAFT 1
108 TB EXH	1.84	122.95	1040.6816	3594784.7	LEVL = -9648.0
76 ENTRY	0.	0.	0.	1020332.7	
122 DRAIN	0.	0.	0.	4624765.4	
					GENERATOR 1
					SHAFT 1

MEASURED LOAD = 855960.0 PF = 0.987 H2 = 64.00
SHAFT 1 KW = 867816.4 FL =4353.0 GL = 7503.4

TEST CYCLE HEAT BALANCE

P E R F O R M A N C E

TRUNKLINE OUTPUT

TL	P	T	H	Q	SV	SF	PV	TR
1	2728.4	552.1	549.1	6161067.	0.0213	0.	0.	-8551.0
2	1062.5	795.7	1383.9	579451.	0.6399	551.990	-0.110	243.7
3.	1062.5	485.8	471.2	579451.	0.0200	0.	7.300	0.
4	2728.4	478.5	463.2	6161067.	0.	0.	0.	0.
5	553.1	624.3	1309.8	544362.	1.0701	477.533	-0.967	146.8
6	553.1	403.3	379.0	1123814.	0.0186	0.	8.800	0.
7	2728.4	394.5	372.3	6161067.	0.	0.	0.	0.
8	228.7	799.8	1424.2	232170.	3.2200	393.208	-1.292	406.6
9	228.7	352.8	324.8	1355984.	0.0180	0.	7.700	0.
10	2826.0	345.1	321.0	6161067.	0.0177	0.	0.	0.
11	0.	0.	0.	6147184.	0.	0.	0.	0.
12	118:3	617.9	1337.3	278490.	5.3338	340.195	797.000	277.7
13	127.3	295.8	265.5	4513808.	0.0174	0.	0.	0.
14	173.8	295.8	265.6	4513808.	0.0174	1.014	0.	173.8
15	63.3	514.7	1290.1	139339.	9.0533	296.184	0.384	218.5
16	63.3	268.6	237.6	139339.	0.0172	0.	4.600	0.
17	173.8	264.0	233.1	4513808.	0.	0.	0.	0.
18	38.2	413.7	1243.3	280903.	13.4391	264.528	0.528	149.2
19	38.2	205.2	173.4	420242.	0.0167	0.	9.100	0.
20	173.8	196.1	164.5	4513808.	0.	0.	0.	0.
21	11.0	233.5	1162.1	141555.	37.0328	197.914	1.814	35.6
22	11.0	167.9	135.9	561797.	0.0164	0.	7.400	0.
23	173.8	160.5	128.9	4513808.	0.	0.	0.	0.
24	1500.0	200.0	171.5	0.	0.0166	0.	0.	0.
25	4.9	0.	1087.6	120442.	0.	161.064	0.564	-161.1
26	222.1	128.7	97.2	4513808.	0.0162	0.	0.	0.
27	0.	0.	0.	4624765.	0.	0.	0.	0.
28	0.	0.	0.	18723.	0.	0.	0.	0.
29	0.	0.	0.	46958.	0.	0.	0.	0.
30	0.	0.	0.	65681.	0.	0.	0.	0.
31	2835.9	342.6	318.5	31393.	0.0177	1.000	0.	2835.9
33	0.	0.	0.	4624765.	0.	0.	0.	0.
34	0.	0.	0.	-8551.	0.	0.	0.	0.
35	2826.0	345.1	321.0	6192460.	0.0177	0.	0.	0.
36	2384.1	1004.9	1464.7	6183909.	0.3255	0.133E 37	85.583	0.
37	521.6	897.9	1464.7	2772.	1.5012	0.780	18.640	55.7
38	0.	0.	0.	1996.	0.	0.	0.	107.1
39	2384.1	0.	1464.7	6179141.	0.3255	0.	85.583	0.
40	1918.0	942.3	1440.1	6123308.	0.3891	147.682	70.211	0.
41	1086.4	0.	1384.7	5525420.	0.6266	555.122	41.638	843.1
42	123.2	700.0	1378.4	13575.	5.5340	0.779	4.718	0.0
43	17.1	690.5	1379.0	4274.	39.8960	0.	0.655	1030.4
45	0.	0.	0.	37914.	0.	0.	0.	0.
46	121.9	609.3	1332.8	4790.	5.1311	0.703	4.874	378.7
47	17.0	589.2	1329.9	3438.	36.6111	0.	0.682	826.0
48	0.	0.	0.	5563335.	0.	0.	0.	0.
49	566.0	625.1	1309.2	5554519.	1.0443	479.972	23.281	0.
50	566.0	625.1	1309.2	5010157.	0.	0.	0.	0.
51	511.0	999.0	1519.5	5030848.	1.6614	0.	17.541	0.

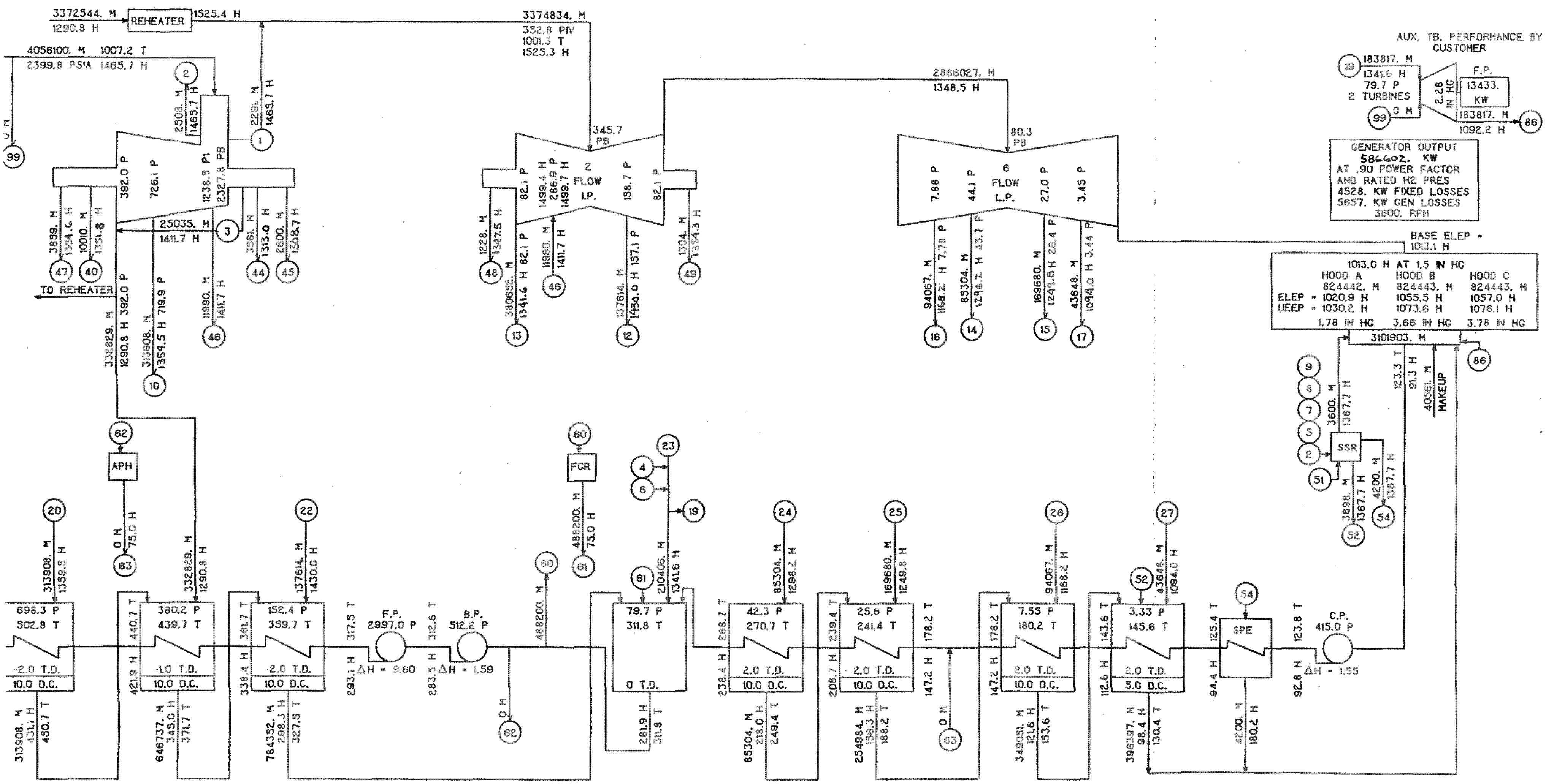
TL	P	T	H	Q	SV	SP	PV	TR
52	233.0	0.	1414.8	4798678.	3.1161	395.222	8.647	780.3
53	230.4	801.2	1424.8	232170.	3.1996	393.848	8.486	0.
54	118.5	617.2	1337.0	4793476.	5.3210	0.	4.719	0.
55	121.4	620.2	1338.3	516452.	5.2071	342.138	0.	0.
56	118.5	617.2	1337.0	4277024.	5.3210	340.322	0.	0.
57	17.0	634.3	1351.7	1919.	38.2676	0.	0.666	1102.3
58	17.0	643.4	1356.1	2108.	38.5658	0.	0.664	4926.7
59	118.5	617.2	1337.0	4277024.	5.3210	0.	4.719	0.
60	64.4	525.3	1295.2	139339.	8.9984	297.323	2.674	0.
61	65.2	0.	1277.7	4137685.	8.5545	298.277	2.761	1059.4
62	39.2	421.3	1246.9	280903.	13.2395	265.955	1.720	0.
63	39.7	0.	1233.2	3856782.	12.6351	266.971	1.773	1076.4
64	11.5	233.4	1161.9	141555.	35.5932	199.798	0.568	0.
65	11.6	0.	1141.4	3715227.	33.1879	200.920	0.592	1042.3
66	16.7	636.2	1352.6	9585.	39.1192	0.	0.	0.
67	118.3	342.7	1191.6	0.	3.7941	0.	0.	0.
68	2.2	470.0	1274.4	0.	251.0113	0.	0.	0.
69	5.1	660.4	1365.0	1581.	130.5876	0.	0.	0.
70	5.1	660.4	1365.0	4150.	130.5876	0.	0.	0.
71	0.	0.	1464.7	0.	0.	0.	0.	0.
72	0.	0.	0.	797.	0.	0.	0.	0.
73	0.	0.	0.	-9648.	0.	0.	0.	0.
75	0.	0.	0.	6061.	0.	0.	0.	0.
76	0.	0.	0.	1020333.	0.	0.	0.	0.
79	1072.9	797.8	1384.7	579451.	0.6346	553.190	41.119	0.
80	566.0	625.1	1309.2	544362.	0.	0.	0.	0.
81	16.7	636.2	1352.6	0.	39.1192	0.	0.	0.
82	0.	0.	0.	5010157.	0.	0.	0.	0.
83	118.3	340.2	1190.1	300.	0.	0.	0.	0.
84	521.4	1000.2	1519.8	5012929.	1.6281	7.880	17.896	799.9
86	0.	0.	0.	110957.	0.	0.	0.	0.
88	0.	0.	0.	4150.	0.	0.	0.	0.
90	148.3	340.1	311.4	0.	0.0179	0.	0.	0.
91	139.1	245.6	214.4	996406.	0.0170	0.647	0.	139.1
95	1.8	122.9	1032.1	3594785.	173.0669	1040.682	3.739	518.0
99	0.	0.	0.	6462.	0.	0.	0.	0.
100	0.	0.	0.	587.	0.	0.	0.	1769.4
104	2728.4	552.1	549.1	6165490.	0.0213	1.028	0.	2728.4
106	5.0	0.	1087.6	120442.	70.9891	161.828	0.264	0.
107	5.0	0.	1088.6	3594785.	70.1785	0.	0.267	1112.1
108	1.8	122.9	1040.7	3594785.	188.2706	1040.682	3.739	-9648.0
109	0.	0.	278.0	2352390.	0.	0.	0.	0.
111	118.3	340.1	311.4	7143590.	0.0179	0.	0.095	0.
112	0.	0.	1440.1	55833.	0.	0.	0.	0.
113	0.	0.	0.	6104872.	0.	0.	0.115E 19	0.
114	411.6	128.0	97.0	14915.	0.0162	0.624	0.	411.6
115	411.6	128.0	97.0	8971.	0.0162	0.624	0.	411.6
116	411.6	128.0	97.0	28375.	0.0162	0.623	0.	411.6
117	411.6	128.0	97.0	13843.	0.0162	0.660	0.	411.6
118	411.6	128.0	97.0	22578.	0.0162	0.660	0.	411.6
119	411.6	128.0	97.0	22274.	0.0162	0.660	0.	411.6
120	0.	0.	0.	4768.	0.	0.	0.	0.
122	0.	0.	0.	4624765.	0.	0.	0.	0.
123	4.9	134.2	102.2	686389.	0.0163	0.	5.500	0.
125	529.5	827.0	1426.6	17919.	1.3913	0.628	0.	515.5
130	0.	0.	0.	256327.	0.	0.	0.	0.
131	119.3	617.8	1337.2	131273.	5.2878	1.019	0.	119.3
132	119.1	617.5	1337.1	125054.	5.2953	1.019	0.	119.1
133	0.	0.	0.	255740.	0.	0.	0.	0.
201	0.1	0.	1519.8	0.	0.	210.590	0.	0.

G. 9B

TURBINE AND EXTRACTION ARRANGEMENT IS SCHEMATIC ONLY

CONTRACT CYCLE HEAT BALANCE TEST No.3

THE VALUE OF GENERATOR OUTPUT SHOWN ON THIS HEAT BALANCE IS AFTER ALL POWER FOR EXCITATION AND OTHER TURBINE-GENERATOR AUXILIARIES HAS BEEN DEDUCTED.



$$\text{POINT}\ \text{TE} = \frac{\begin{array}{l}3101903\ (1.55) \\ +4056.1\ (720.3 - 493.0) \\ +4056100.\ (1465.7 - 493.0) \\ +3372544.\ (1525.4 - 1290.8)\end{array}}{586602.} = 8084.6\ \frac{\text{BTU}}{\text{KW-HR}}$$

LEGEND - CALCULATIONS BASED ON 1967 ASME STEAM TABLES
M - FLOW-LB/HR
P - PRESSURE-PSIA
H - ENTHALPY-BTU/LB
T - TEMPERATURE-F DEGREES

9048T 1 0 1

KW / / IN HG ABS.
CONTRACT CYCLE HEAT BALANCE TEST NO.3
TC6F 30.0 IN. LSB 3600 RPM
2400.0 PSIA 1000. / 1000. F
GEN- 991000. KVA .90 PF LIQ

RAL ELECTRIC COMPANY. SCHENECTADY N.Y.

TP-3

5/14/87

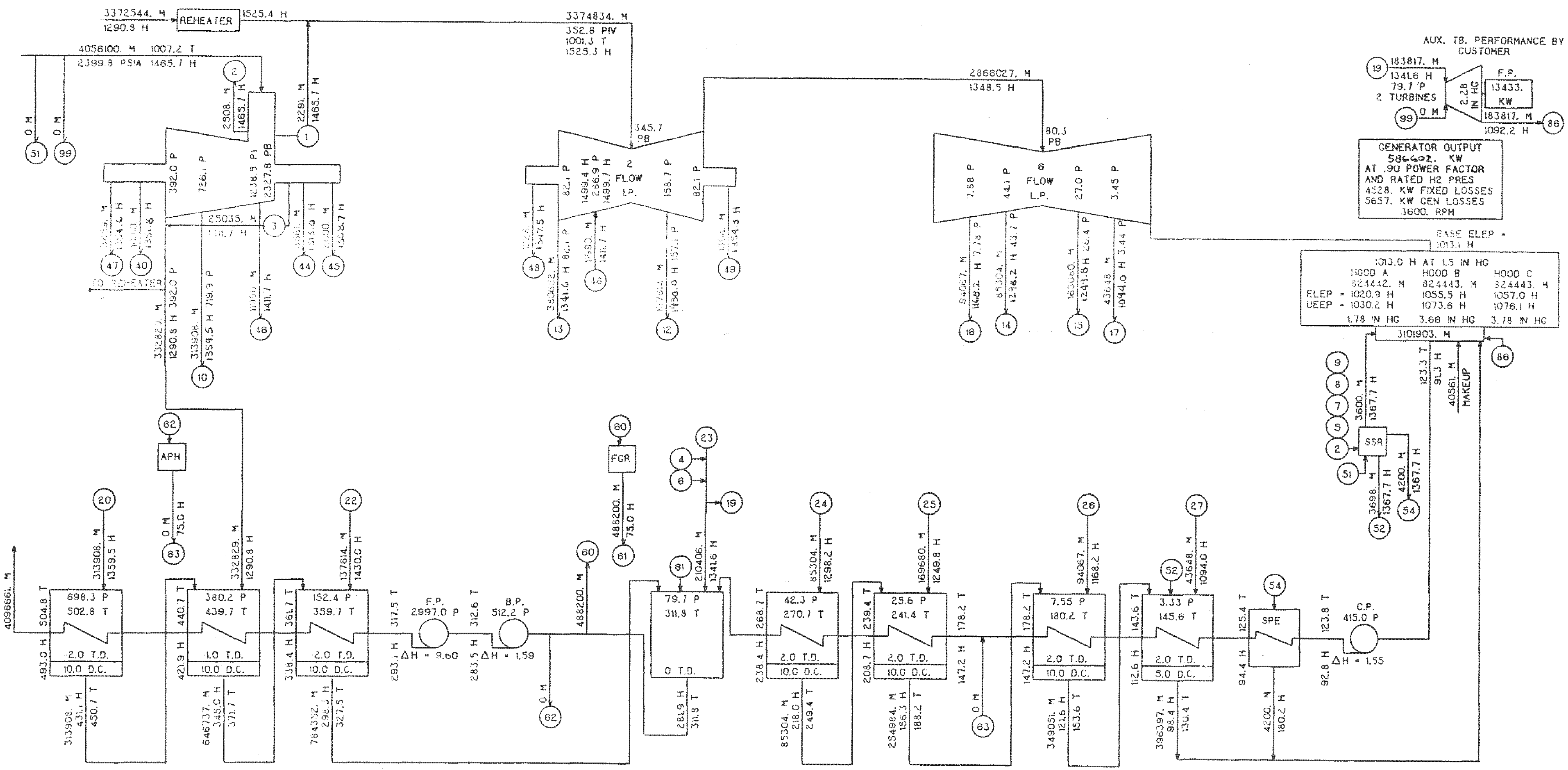
FIG. 9B

FIG. 9B

TURBINE AND EXTRACTION ARRANGEMENT IS SCHEMATIC ONLY

CONTRACT CYCLE HEAT BALANCE TEST No. 3

THE VALUE OF GENERATOR OUTPUT SHOWN ON THIS HEAT BALANCE IS AFTER ALL POWER FOR EXCITATION AND OTHER TURBINE-GENERATOR AUXILIARIES HAS BEEN DEDUCTED.



3101903 (1.55)
+4056.1 (720.3 - 493.0)
+4056100. (1465.7 - 493.0)
VALVE BEST POINT NET HEAT RATE = +3372544. (1525.4 - 1290.8) / 586602. = 8084.6 BTU/KW-HR

LEGEND - CALCULATIONS BASED ON 1967 ASME STEAM TABLES
M - FLOW-LB/HR
P - PRESSURE-PSIA
H - ENTHALPY-BTU/LB
T - TEMPERATURE-F DEGREES

9048T 1 0 1

KW / / IN HG ABS.
CONTRACT CYCLE HEAT BALANCE TEST NO.3
TC6F 30.0 IN. LSB 3600 RPM
2400.0 PSIA 1000. / 1000. F
GEN- 991000. KVA .90 PF LIQ

GENERAL ELECTRIC COMPANY. SCHENECTADY N.Y.

5/14/87

Fig. 9B

TEST CYCLE HEAT BALANCE

VALVE POINT 2ND VL	05/13/87	TEST POINT 03
INTERMOUNTAIN PWR PROJECT		UNIT #2
820000. KW	TC6F-30 IN LSB	TURBINE NO 270T151
2400. PSIG	1000./ 1000. F	2.300 IN HG ABS

CALCULATED USING ASME STEAM TABLES

COMBINED TURBINE-CYCLE PERFORMANCE

	TEST CONDITIONS	* RATED CONDITIONS
TOTAL LOAD	592031.	591526.
HEAT RATE	7980.0	7986.8
THROTTLE FLOW	4056100.	4099223.

TURBINE THERMAL PERFORMANCE

	HIGH PRESS TB		REHEAT TB		
			IP TB		LP TB
	THROTTLE	COLD RHT	INLET	EXH	EXH
PRESS	2399.80	384.30	354.00	81.02	3.074
TEMP	1007.20	566.80	1000.44	621.20	115.92
ENTH	1465.68	1289.21	1524.83	1341.35	1046.78
ENTR	1.5365		1.7775	1.7925	
EFF	81.515		92.000		94.013

ABSCISSA PHPX/PT=0.1601 P1STSTG/PT=0.5148 VAN= 440.9

THRU FLOW PERFORMANCE OF CONDENSING SECTION SHAFT NO 1

	TOTAL TB ENERGY BALANCE		LP TB ENERGY BALANCE	
	RHT TB	LP TB	RHT TB	LP TB
AE	508.50	316.38		
H ELEP	1046.78		1046.78	
H UEEP	1059.29		1059.29	
EFF ELEP	94.01	93.10	94.01	93.10
EFF UEEP	91.55	89.15	91.55	89.15
VAN	440.89		440.89	

* LOAD AND HEAT RATE AT RATED POWER FACTOR AND H2 PRESS. FLOW AT RATED THROTTLE PRESS. OF 2412.2 PSIA AND TEMP. OF 1000 F.

A03-1

T G L PERFORMANCE OF CONDENSING SECTION SHAFT NO 1

	TOTAL TB ENERGY BALANCE RHT TB	LP TB	LP TB ENERGY BALANCE RHT TB	LP TB
H ELEP	1048.96		1048.96	
H UEEP	1061.46		1061.46	
EFF ELEP	93.58	92.42	93.58	92.42
EFF UEEP	91.13	88.47	91.13	88.47
VAN	441.89		441.89	

STAGE FLOW FUNCTION

STG NO	SHELL PRESS	ONE VEL HD	PCT DELTA P	FLANGE PRESS	NOZ AREA	Q/AP H FLG	QFS	Q/AP H SHL
1	1235.50	0.	0.	0.	86.6	0.	4014276.	999.8
4	718.77	1.959	0.86	712.60	157.4	832.0	3673957.	828.4
RH 1	354.00	0.	0.	0.	350.2	0.	3375577.	796.7
8	346.92	0.	0.	0.	350.2	0.	3387567.	815.7
11	157.60	0.499	1.01	156.00	711.2	791.5	3238282.	782.2
15	81.02	0.	0.	0.	807.6	0.	2910222.	1122.1
15	44.64	0.156	1.01	44.19	1414.8	1087.0	2825494.	1064.1
16	27.27	0.110	1.17	26.95	2021.4	1105.3	2648608.	1084.7
18	7.96	0.035	1.27	7.86	6018.0	1097.7	2558119.	1053.2
19	3.48	0.007	0.62	3.46	12096.0	1111.6	2497392.	1108.1

F E E D W A T E R C Y C L E

TL		PRESS	TEMP	ENTH	FLOW		
						HEATER	8
4	FW IN	2598.00	441.40	422.30	4060147.6	CLOSED	
2	EXTR	708.80	720.70	1357.50	326721.3	TD =	-4.0
3	DRAIN	708.80	445.80	425.69	326721.3	DC =	4.4
						HEATER	7
7	FW IN	2598.00	365.10	341.35	4060147.6	CLOSED	
5	EXTR	376.80	566.00	1289.43	319656.0	TD =	-2.6
6	DRAIN	376.80	371.10	344.36	646377.3	DC =	6.0
3	ENTRY	708.80	445.80	425.69	326721.3		
						HEATER	6
10	FW IN	2728.40	316.30	291.30	4060147.6	CLOSED	
8	EXTR	155.70	800.90	1427.81	149285.1	TD =	-3.7
9	DRAIN	155.70	321.70	292.28	795662.4	DC =	5.4
6	ENTRY	376.80	371.10	344.36	646377.3		
						PUMP	
11	FW IN	0.	0.	0.	4021693.2		
86	SEAL INJ	0.	0.	0.	93029.4		
30	SEAL RET	0.	0.	0.	54575.0		
32	LEAKAGE	0.	0.	0.	0.		
24	EXTR	1500.00	246.50	218.13	0.		
35	FW OUT	2728.40	316.30	291.30	4060147.6		
						HEATER	5
13	FW IN	89.01	272.80	241.90	3044763.5	OPEN	
12	EXTR	80.19	617.90	1339.77	182250.9	STD =	778.4
111	DRAIN	80.19	312.50	282.62	5171452.2	SC =	-0.3
109	ENTRY	0.	0.	247.45	1945421.4		
						HEATER	4
17	FW IN	131.80	243.30	212.01	3044763.8	CLOSED	
15	EXTR	43.47	514.70	1291.86	84727.4	TD =	-0.5
16	DRAIN	43.47	246.30	214.87	84727.4	DC =	3.0
						HEATER	3
20	FW IN	131.80	178.60	146.89	3044763.8	CLOSED	
18	EXTR	25.99	414.90	1245.52	176886.0	TD =	-1.1
19	DRAIN	25.99	185.70	153.76	261613.4	DC =	7.1
16	ENTRY	43.47	246.30	214.87	84727.4		
						HEATER	2
23	FW IN	131.80	146.10	114.36	3044763.8	CLOSED	
21	EXTR	7.51	238.60	1165.62	90489.1	TD =	1.4
22	DRAIN	7.51	164.60	132.57	352102.6	DC =	18.5
19	ENTRY	25.99	185.70	153.76	261613.4		

TL		PRESS	TEMP	ENTH	FLOW		
						STM SEAL REG	
88	FLOW TO	0.	0.	0.	2353.0	CALCULATED	
70	TDV	1.57	563.90	1318.84	2353.0	TO HEATER	
68	TDV	1.85	480.00	1279.09	0.	TO CONDENSER	
	NOT CODED FOR MU		MEAS TOTAL FLOW =		0.		
						HEATER	1
26	FW IN	171.00	125.10	93.49	3044763.8	CLOSED	
25	EXTR	3.44	0.	1094.42	60727.6	TD =	0.8
123	DRAIN	3.44	127.20	95.16	63080.6	DC =	2.1
70	ENTRY	1.57	563.90	1318.84	2353.0		
						PUMP	
33	FW IN	0.	0.	0.	3137793.2		
87	LEAKAGE	0.	0.	0.	0.		
27	FW OUT	0.	0.	0.	3137793.2		
						FW TO BOILER	
1	FW IN	2598.00	508.50	497.28	4060147.6	S+L =	-4047.

T U R B I N E   E X P A N S I O N

						MAIN STEAM LINE	
71	EXIT	0.	0.	1465.68	0.		
36	THROTTLE	2399.80	1007.20	1465.68	4056100.2		
						VALVE STEM LKG	
						SQRT P/V =	86.079
37	LO NO 1	354.20	888.64	1465.68	2281.2	C =	55.758
						SQRT P/V =	12.638
38	LO NO 2	0.	0.	0.	2518.4	C =	199.263
						EXP TO STG	1
40	SHELL	1235.50	849.55	1409.00	4014275.6		
112	EXTR	0.	0.	1409.00	37025.0		
						PACKING NO	2
						SQRT P/V =	.115E 19
42	LO NO 1	84.08	641.00	1351.05	9647.6	C =	0.000
						SQRT P/V =	3.302
43	LO NO 2	13.68	638.50	1353.91	3385.9	C =	1196.275
						SQRT P/V =	0.535
100	LO NO 3	0.	0.	0.	563.9	C =	2117.000

TL	PRESS	TEMP	ENTH	FLOW	
					EXP TO STG 4
41 SHELL	718.77	0.	1358.47	3673956.9	
79 EXTR	712.60	722.70	1358.47	326721.3	
					PACKING NO 1
					SQRT P/V = 16.123
46 LO NO 1	83.16	562.80	1312.29	3408.0	C = 374.646
					SQRT P/V = 3.394
47 LO NO 2	13.63	543.10	1308.00	2068.6	C = 775.546
					SQRT P/V = 0.558
100 LO NO 3	0.	0.	0.	563.9	C = 2117.000
					EXPAND TO EXHAUST
49 EXH	384.30	566.80	1289.21	3692951.8	
80 EXTR	384.30	566.80	1289.21	319656.0	
50 TO RHT	384.30	566.80	1289.21	3373295.8	
					REHEATER 1
BEFORE LO	0.08	0.	1525.33	0.	
37 ENTRY					
84 AFTER LO	354.00	1001.30	1525.29	3375577.0	PCTDP = 7.884
					EXPAND TO BOWL
51 ENTRY	346.92	1000.05	1524.83	3387566.6	
125 ENTRY	359.51	757.60	1396.77	11989.6	
					EXP TO STG 11
52 SHELL	157.60	0.	1419.01	3238281.5	
53 EXTR	156.00	803.30	1429.02	149285.1	
					PACKING NO 3
					SQRT P/V = 3.211
57 LO NO 1	13.63	627.10	1348.40	1237.9	C = 1146.047
					SQRT P/V = 0.536
58 LO NO 2	13.63	641.10	1355.17	1314.7	C = 4555.333
					SQRT P/V = 0.533
100 LO NO 3	0.	0.	0.	563.9	C = 2117.000
					SQRT P/V = 0.
100 LO NO 4	0.	0.	0.	563.9	C = 2117.000

TL	PRESS	TEMP	ENTH	FLOW	
					EXPAND TO EXHAUST
56 EXH	81.02	621.20	1341.35	2910221.7	
55 EXTR	82.83	623.60	1342.42	324379.4	
					EXPAND TO BOWL
59 ENTRY	81.02	621.20	1341.35	2910221.7	
					EXP TO STG 15
61 SHELL	44.64	0.	1282.30	2825494.2	
60 EXTR	44.19	530.10	1299.28	84727.4	
					EXP TO STG 16
63 SHELL	27.27	0.	1237.67	2648608.2	
62 EXTR	26.95	425.50	1250.49	176886.0	
					EXP TO STG 18
65 SHELL	7.96	0.	1144.85	2558119.1	
64 EXTR	7.86	245.60	1168.78	90489.1	
					EXP TO STG 19
107 SHELL	3.48	0.	1093.58	2497391.5	
106 EXTR	3.46	0.	1094.42	60727.6	
					CONDENSER
					SHAFT 1
108 TB EXH	1.51	115.92	1059.2922	2497391.5	LEVL = -5031.0
76 ENTRY	0.	0.	0.	283268.5	
22 ENTRY	7.51	164.60	132.57	352102.6	
122 DRAIN	0.	0.	0.	3137793.6	
					GENERATOR 1
					SHAFT 1

MEASURED LOAD = 592031.0 PF = 0.991 H2 = 58.00
SHAFT 1 KW = 601607.5 FL =4353.0 GL = 5223.5

TEST CYCLE HEAT BALANCE

P E R F O R M A N C E

TRUNKLINE OUTPUT

TL	P	T	H	Q	SV	SP	PV	TR
1	2598.0	508.5	497.3	4060148.	0.0202	0.	0.	-4047.4
2	708.8	720.7	1357.5	326721.	0.9166	504.477	-4.023	216.2
3	708.8	445.8	425.7	326721.	0.0193	0.	4.400	0.
4	2598.0	441.4	422.3	4060148.	0.	0.	0.	0.
5	376.8	566.0	1289.4	319656.	1.5086	438.791	-2.609	127.2
6	376.8	371.1	344.4	646377.	0.0182	0.	6.000	0.
7	2598.0	365.1	341.3	4060148.	0.	0.	0.	0.
8	155.7	800.9	1427.8	149285.	4.7626	361.381	-3.719	439.5
9	155.7	321.7	292.3	795662.	0.0177	0.	5.400	0.
10	2728.4	316.3	291.3	4060148.	0.0174	0.	0.	0.
11	0.	0.	0.	4021693.	0.	0.	0.	0.
12	80.2	617.9	1339.8	182251.	7.9129	312.204	778.400	305.7
13	89.0	272.8	241.9	3044764.	0.0172	0.	0.	0.
14	131.8	272.8	242.0	3044764.	0.0172	1.014	0.	131.8
15	43.5	514.7	1291.9	84727.	13.2309	272.313	-0.487	242.4
16	43.5	246.3	214.9	84727.	0.0170	0.	3.000	0.
17	131.8	243.3	212.0	3044764.	0.	0.	0.	0.
18	26.0	414.9	1245.5	176886.	19.8773	242.229	-1.071	172.7
19	26.0	185.7	153.8	261613.	0.0165	0.	7.100	0.
20	131.8	178.6	146.9	3044764.	0.	0.	0.	0.
21	7.5	238.6	1165.6	90489.	55.0083	180.006	1.406	58.6
22	7.5	164.6	132.6	352103.	0.0164	0.	18.500	0.
23	131.8	146.1	114.4	3044764.	0.	0.	0.	0.
24	1500.0	246.5	218.1	0.	0.0169	0.	0.	0.
25	3.4	0.	1094.4	60728.	0.	146.922	0.822	-146.9
26	171.0	125.1	93.5	3044764.	0.0162	0.	0.	0.
27	0.	0.	0.	3137793.	0.	0.	0.	0.
28	0.	0.	0.	16805.	0.	0.	0.	0.
29	0.	0.	0.	37770.	0.	0.	0.	0.
30	0.	0.	0.	54575.	0.	0.	0.	0.
31	2835.9	300.4	275.3	0.	0.0173	0.	0.	0.
33	0.	0.	0.	3137793.	0.	0.	0.	0.
34	0.	0.	0.	-4047.	0.	0.	0.	0.
35	2728.4	316.3	291.3	4060148.	0.0174	0.	0.	0.
36	2399.8	1007.2	1465.7	4056100.	0.3239	1465.676	86.079	0.
37	354.2	888.6	1465.7	2281.	2.2175	0.780	12.638	55.8
38	0.	0.	0.	2518.	0.	0.	0.	199.3
39	2399.8	0.	1465.7	4051301.	0.3239	0.	86.079	0.
40	1235.5	849.5	1409.0	4014276.	0.5748	135.303	46.362	0.
41	718.8	0.	1358.5	3673957.	0.9054	506.828	28.175	828.4
42	84.1	641.0	1351.0	9648.	7.7125	0.779	3.302	0.0
43	13.7	638.5	1353.9	3386.	47.7318	0.	0.535	1196.3
45	0.	0.	0.	25035.	0.	0.	0.	0.
46	83.2	562.8	1312.3	3408.	7.2177	0.703	3.394	374.6
47	13.6	543.1	1308.0	2069.	43.7136	0.	0.558	775.5
48	0.	0.	0.	3698992.	0.	0.	0.	0.
49	384.3	566.8	1289.2	3692952.	1.4783	440.698	16.123	0.
50	384.3	566.8	1289.2	3373296.	0.	0.	0.	0.
51	346.9	1000.1	1524.8	3387567.	2.4682	0.	11.859	0.

TL	P	T	H	Q	SV	SP	PV	TR
52	157.6	0.	1419.0	3238282.	4.6515	362.797	5.821	782.2
53	156.0	803.3	1429.0	149285.	4.7628	361.534	5.723	0.
54	81.0	621.2	1341.3	3234601.	7.8559	0.	3.211	0.
55	82.8	623.6	1342.4	324379.	7.7001	314.452	0.	0.
56	81.0	621.2	1341.3	2910222.	7.8559	312.917	0.	0.
57	13.6	627.1	1348.4	1238.	47.4065	0.	0.536	1146.0
58	13.6	641.1	1355.2	1315.	48.0213	0.	0.533	4555.3
59	81.0	621.2	1341.3	2910222.	7.8559	0.	3.211	0.
60	44.2	530.1	1299.3	84727.	13.2263	273.323	1.828	0.
61	44.6	0.	1282.3	2825494.	12.6739	274.292	1.877	1064.1
62	27.0	425.5	1250.5	176886.	19.4038	244.258	1.179	0.
63	27.3	0.	1237.7	2648608.	18.6886	245.363	1.208	1084.7
64	7.9	245.6	1168.8	90489.	53.0936	182.061	0.385	0.
65	8.0	0.	1144.8	2558119.	48.8779	183.152	0.404	1053.2
66	13.4	612.0	1341.1	8173.	47.4053	0.	0.	0.
67	80.2	315.0	1184.7	0.	5.4836	0.	0.	0.
68	1.8	480.0	1279.1	0.	302.4288	0.	0.	0.
69	1.6	563.9	1318.8	0.	387.7559	0.	0.	0.
70	1.6	563.9	1318.8	2353.	387.7559	0.	0.	0.
71	0.	0.	1465.7	0.	0.	0.	0.	0.
72	0.	0.	0.	778.	0.	0.	0.	0.
73	0.	0.	0.	-5031.	0.	0.	0.	0.
75	0.	0.	0.	4789.	0.	0.	0.	0.
76	0.	0.	0.	283268.	0.	0.	0.	0.
79	712.6	722.7	1358.5	326721.	0.9134	505.075	27.932	0.
80	384.3	566.8	1289.2	319656.	0.	0.	0.	0.
81	13.4	612.0	1341.1	0.	47.5471	0.	0.	0.
82	0.	0.	0.	3373296.	0.	0.	0.	0.
83	80.2	312.2	1183.1	205.	0.	0.	0.	0.
84	354.0	1001.3	1525.3	3375577.	2.4187	7.884	12.098	796.7
86	0.	0.	0.	93029.	0.	0.	0.	0.
88	0.	0.	0.	2353.	0.	0.	0.	0.
90	110.1	312.5	282.7	0.	0.0176	0.	0.	0.
91	114.8	247.7	216.4	1149759.	0.0170	0.647	0.	114.8
95	1.5	115.9	1046.8	2497392.	212.0179	1059.292	3.074	440.9
99	0.	0.	0.	6204.	0.	0.	0.	0.
100	0.	0.	0.	564.	0.	0.	0.	2117.0
104	2598.0	508.5	497.3	4075897.	0.0202	1.028	0.	2598.0
106	3.5	0.	1094.4	60728.	100.7990	147.072	0.185	0.
107	3.5	0.	1093.6	2497392.	100.2007	0.	0.186	1108.1
108	1.5	115.9	1059.3	2497392.	226.3461	1059.292	3.074	-5031.0
109	0.	0.	247.5	1945421.	0.	0.	0.	0.
111	80.2	312.5	282.6	5171452.	5.4615	0.	-0.296	0.
112	0.	0.	1409.0	37025.	0.	0.	0.	0.
113	0.	0.	0.	4000678.	0.	0.	0.115E 19	0.
114	474.8	123.5	92.7	14413.	0.0162	0.624	0.	474.8
115	474.8	123.5	92.7	8053.	0.0162	0.624	0.	474.8
116	474.8	123.5	92.7	26462.	0.0162	0.623	0.	474.8
117	474.8	123.5	92.7	18791.	0.0162	0.660	0.	474.8
118	474.8	123.5	92.7	0.	0.0162	0.	0.	0.
119	474.8	123.5	92.7	25311.	0.0162	0.660	0.	474.8
120	0.	0.	0.	4800.	0.	0.	0.	0.
122	0.	0.	0.	3137794.	0.	0.	0.	0.
123	3.4	127.2	95.2	63081.	0.0162	0.	2.100	0.
125	359.5	757.6	1396.8	11990.	1.9516	0.628	0.	350.7
130	0.	0.	0.	155184.	0.	0.	0.	0.
131	81.4	617.9	1339.7	77380.	7.7968	1.018	0.	81.4
132	81.4	617.6	1339.5	77804.	7.7916	1.019	0.	81.4
133	0.	0.	0.	154620.	0.	0.	0.	0.
201	0.1	0.	1525.3	0.	0.	236.117	0.	0.

A03-B

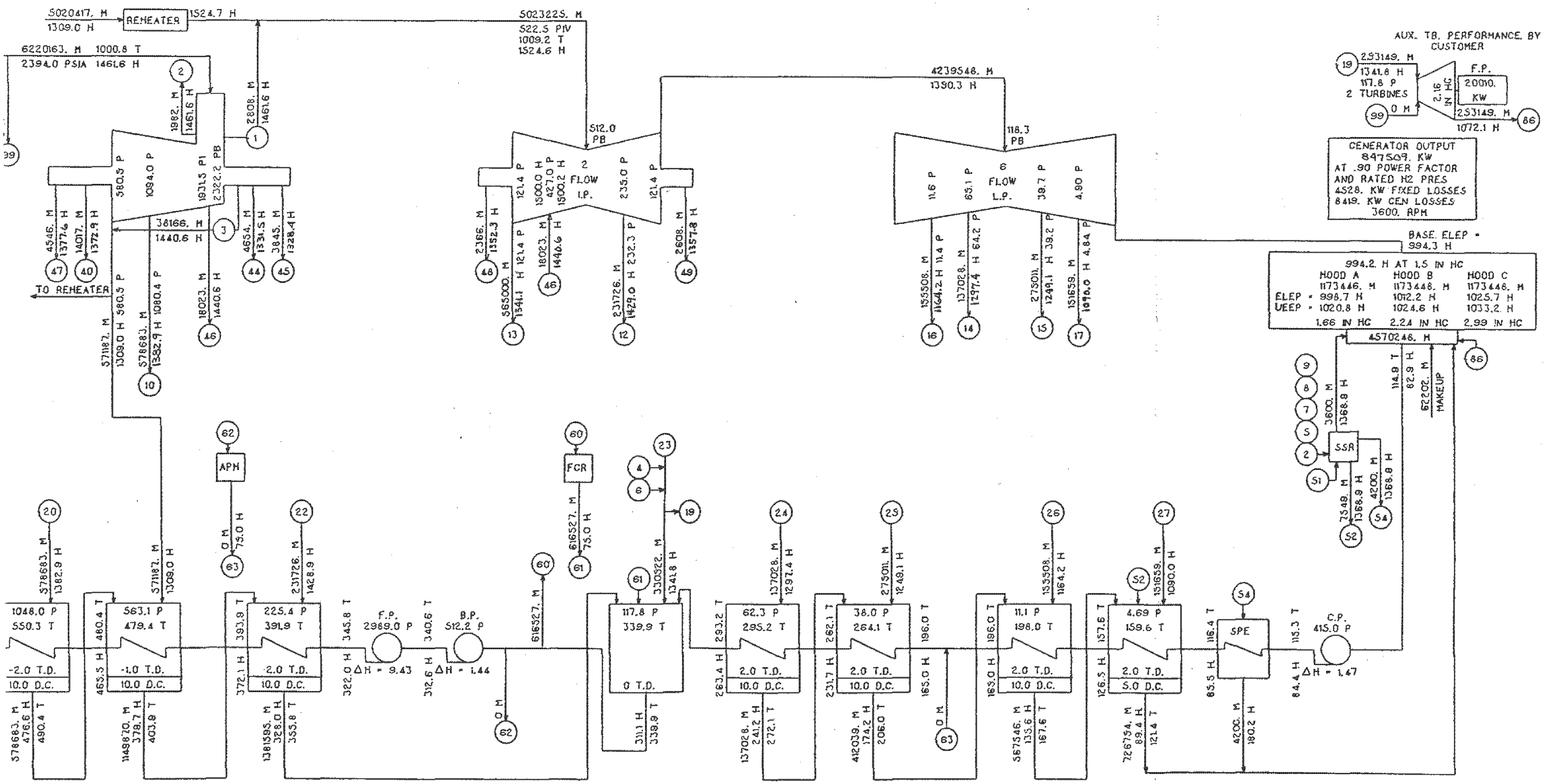
:. 9C

TURBINE AND EXTRACTION ARRANGEMENT IS SCHEMATIC ONLY

CALCULATED DATA - NOT GUARANTEED

CONTRACT CYCLE HEAT BALANCE TEST No. 4

RATING FLOW IS 5974568. M AT INLET STEAM CONDITIONS OF 2412.2 PSIA AND 1000.0 T TO ASSURE THAT THE TURBINE WILL PASS THIS FLOW, CONSIDERING VARIATIONS IN FLOW COEFFICIENTS FROM EXPECTED VALUES, SHOP TOLERANCES ON DRAWING AREAS, ETC. WHICH MAY AFFECT THE FLOW, THE TURBINE IS BEING DESIGNED FOR A DESIGN FLOW (RATING FLOW PLUS 5.0 PERCENT) OF 6273296. M
THE EQUIVALENT DESIGN FLOW AT 2394.0 PSIA AND 1000.8 T IS 6220130. M .
THE VALUE OF GENERATOR OUTPUT SHOWN ON THIS HEAT BALANCE IS AFTER ALL POWER FOR EXCITATION AND OTHER TURBINE-GENERATOR AUXILIARIES HAS BEEN DEDUCTED.



$$\frac{\begin{array}{l}4570248.\ (\ 1.47\ ) \\ +66202.\ (\ 719.6 - 549.0\ ) \\ +6220163.\ (\ 1461.6 - 549.0\ ) \\ +5020417.\ (\ 1524.7 - 1309.0\ )\end{array}}{847509.} = 7984.9 \ \frac{\text{BTU}}{\text{KW-HR}}$$

OINT
E

LEGEND - CALCULATIONS BASED ON 1967 ASME STEAM TABLES
M - FLOW-LB/HR
P - PRESSURE-PSIA
H - ENTHALPY-BTU/LB
T - TEMPERATURE-F DEGREES

KW / / IN HC ABS.
CONTRACT CYCLE HEAT BALANCE TEST NO.4
TC6F 30.0 IN. LSB 3600 RPM
2400.0 PSIA 1000. / 1000. T
GEN- 991000. KVA .90 PF LIQ

9694T 1 0 1

TP-4

FIG. 9C

5/14/87

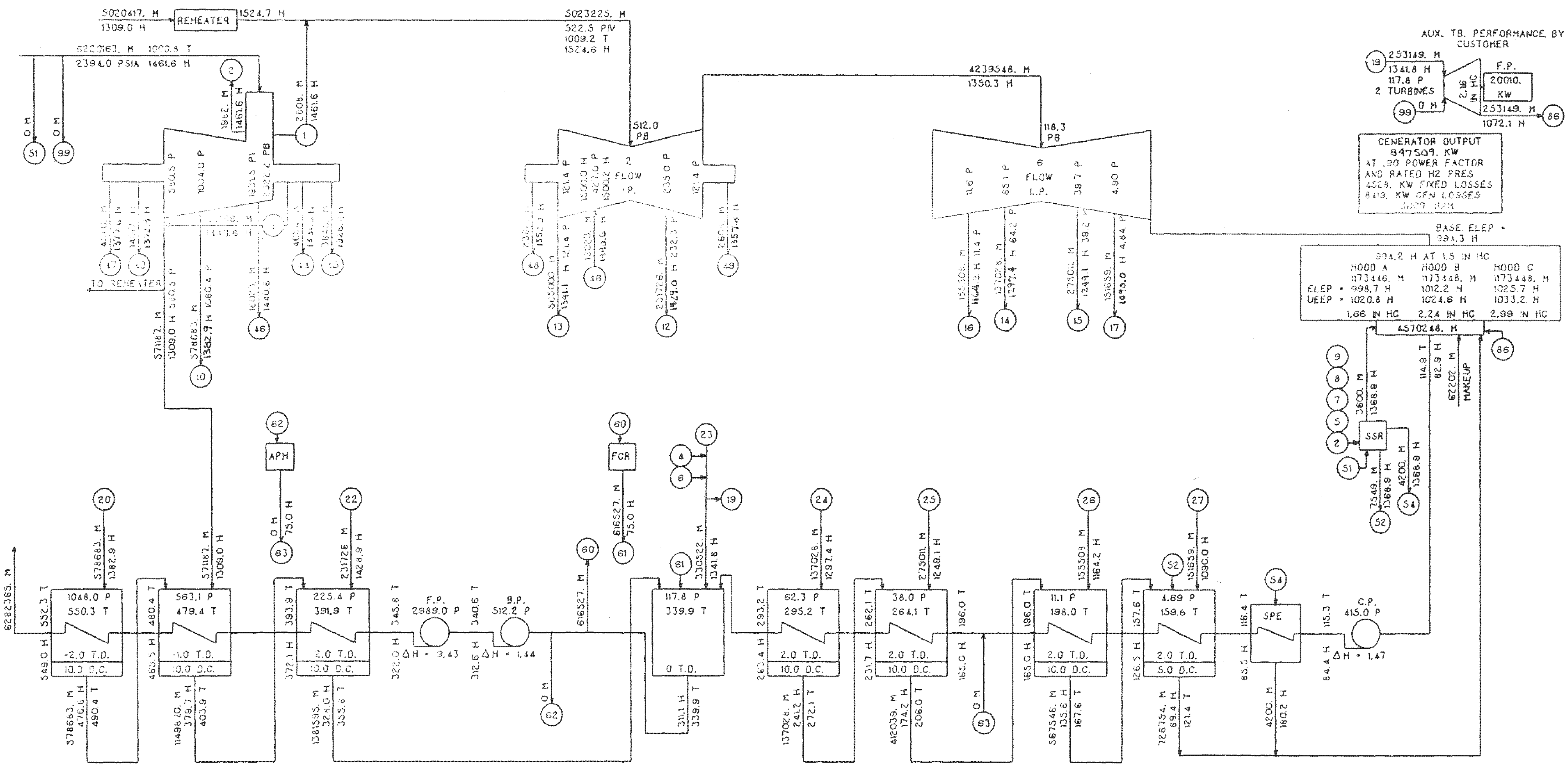
FIG. 9C

TURBINE AND EXTRACTION ARRANGEMENT IS SCHEMATIC ONLY

CALCULATED DATA - NOT GUARANTEED

CONTRACT CYCLE HEAT BALANCE TEST No. 4

RATING FLOW IS 5974568. H AT INLET STEAM CONDITIONS OF 2412.2 PSIA AND 1000.0 T TO ASSURE THAT THE TURBINE WILL PASS THIS FLOW, CONSIDERING VARIATIONS IN FLOW COEFFICIENTS FROM EXPECTED VALUES, SHOP TOLERANCES ON DRAWING AREAS, ETC. WHICH MAY AFFECT THE FLOW, THE TURBINE IS BEING DESIGNED FOR A DESIGN FLOW (RATING FLOW PLUS 5.0 PERCENT) OF 6273296. H THE EQUIVALENT DESIGN FLOW AT 2394.0 PSIA AND 1000.8 T IS 6220030. H .
THE VALUE OF GENERATOR OUTPUT SHOWN ON THIS HEAT BALANCE IS AFTER ALL POWER FOR EXCITATION AND OTHER TURBINE-GENERATOR AUXILIARIES HAS BEEN DEDUCTED.



$$\text{VALVE BEST POINT NET HEAT RATE} = \frac{4570248.\,(1.47) + 6620.2\,(719.6 - 549.0) + 6220163.\,(1461.6 - 549.0) + 5020417.\,(1524.7 - 1309.0)}{847509.} = 7984.9\ \frac{\text{BTU}}{\text{KW-HR}}$$

LEGEND - CALCULATIONS BASED ON 1967 ASME STEAM TABLES
M - FLOW-LB/HR
P - PRESSURE-PSIA
H - ENTHALPY-BTU/LB
T - TEMPERATURE-F DEGREES

KW / / IN HG ABS.
CONTRACT CYCLE HEAT BALANCE TEST NO.4
TC6F 30.0 IN. LSB 3600 RPM
2400.0 PSIA 1000. / 1000. T
GEN- 991000. KVA .90 PF LIQ

9694T 1 0 1

Fig. 9C

5/14/87

GENERAL ELECTRIC COMPANY, SCHENECTADY N.Y.

TEST CYCLE HEAT BALANCE

VALVE POINT VWO	05/13/87	TEST POINT 04
INTERMOUNTAIN PWR PROJECT		UNIT #2
820000. KW	TC6F-30 IN LSB	TURBINE NO 270T151
2400. PSIG	1000./ 1000. F	2.300 IN HG ABS

CALCULATED USING ASME STEAM TABLES

COMBINED TURBINE-CYCLE PERFORMANCE

	TEST CONDITIONS	* RATED CONDITIONS
TOTAL LOAD	859850.	858986.
HEAT RATE	7875.4	7883.3
THROTTLE FLOW	6220163.	6281116.

TURBINE THERMAL PERFORMANCE

	HIGH PRESS TB		REHEAT TB		
			IP TB		LP TB
	THROTTLE	COLD RHT	INLET	EXH	EXH
PRESS	2394.00	571.20	526.10	118.90	3.809
TEMP	1000.80	623.00	1008.54	623.60	123.63
ENTH	1461.62	1307.52	1524.17	1340.15	1036.53
ENTR	1.5339		1.7343	1.7497	
EFF	87.890		91.778		93.662

ABSCISSA PHPX/PT=0.2386 P1STSTG/PT=0.8046 VAN= 515.2

THRU FLOW PERFORMANCE OF CONDENSING SECTION SHAFT NO 1

	TOTAL TB ENERGY BALANCE		LP TB ENERGY BALANCE	
	RHT TB	LP TB	RHT TB	LP TB
AE	520.63	327.60		
H ELEP	1036.53		1036.53	
H UEEP	1045.20		1045.20	
EFF ELEP	93.66	92.68	93.66	92.68
EFF UEEP	92.00	90.03	92.00	90.03
VAN	515.24		515.24	

* LOAD AND HEAT RATE AT RATED POWER FACTOR AND H2 PRESS. FLOW AT RATED THROTTLE PRESS. OF 2412.2 PSIA AND TEMP. OF 1000 F.

A04-1

T G L PERFORMANCE OF CONDENSING SECTION SHAFT NO 1

	TOTAL TB ENERGY BALANCE RHT TB	LP TB	LP TB ENERGY BALANCE RHT TB	LP TB
H ELEP	1038.88		1038.88	
H UEEP	1047.54		1047.54	
EFF ELEP	93.21	91.96	93.21	91.96
EFF UEEP	91.55	89.32	91.55	89.32
VAN	516.51		516.51	

STAGE FLOW FUNCTION

STG NO	SHELL PRESS	ONE VEL HD	PCT DELTA P	FLANGE PRESS	NOZ AREA	Q/AP H FLG	QFS	Q/AP H SHL
1	1926.20	0.	0.	0.	86.6	0.	6159187.	1006.3
4	1088.56	4.272	1.24	1075.10	157.4	850.2	5560286.	844.9
RH 1	526.10	0.	0.	0.	350.2	0.	5041443.	799.8
8	515.58	0.	0.	0.	350.2	0.	5059466.	818.9
11	234.73	0.820	1.12	232.10	711.2	791.8	4825868.	782.1
15	118.90	0.	0.	0.	807.6	0.	4304371.	1129.1
15	65.64	0.289	1.28	64.80	1414.8	1089.6	4164668.	1064.6
16	39.97	0.191	1.39	39.42	2021.4	1105.0	3882181.	1082.1
18	11.70	0.058	1.44	11.53	6018.0	1086.5	3739758.	1046.4
19	5.03	0.020	1.13	4.97	12096.0	1125.8	3622591.	1119.5

FEEDWATER CYCLE

TL	PRESS	TEMP	ENTH	FLOW		
					HEATER	8
4 FW IN	2762.80	479.10	463.91	6224686.7	CLOSED	
2 EXTR	1065.00	792.10	1381.58	580635.6	TD =	0.4
3 DRAIN	1065.00	486.30	471.76	580635.6	DC =	7.2
					HEATER	7
7 FW IN	2762.80	395.20	373.10	6224686.7	CLOSED	
5 EXTR	558.00	622.00	1307.96	551437.6	TD =	-0.6
6 DRAIN	558.00	404.00	379.76	1132073.2	DC =	8.8
3 ENTRY	1065.00	486.30	471.76	580635.6		
					HEATER	6
10 FW IN	2911.50	345.80	321.88	6224686.7	CLOSED	
8 EXTR	230.30	807.20	1427.95	233597.1	TD =	-1.4
9 DRAIN	230.30	353.50	325.58	1365670.3	DC =	7.7
6 ENTRY	558.00	404.00	379.76	1132073.2		
					PUMP	
11 FW IN	0.	0.	0.	6180136.6		
86 SEAL INJ	0.	0.	0.	110300.1		
30 SEAL RET	0.	0.	0.	65750.0		
32 LEAKAGE	0.	0.	0.	0.		
24 EXTR	1500.00	295.40	267.69	0.		
35 FW OUT	2911.50	345.80	321.88	6224686.7		
					HEATER	5
13 FW IN	127.90	296.20	265.92	4534595.4	OPEN	
12 EXTR	118.70	624.10	1340.41	280170.6	STO =	0.
111 DRAIN	118.70	340.50	311.78	7090343.3	SC =	-0.1
109 ENTRY	0.	0.	276.69	2275877.0		
					HEATER	4
17 FW IN	174.90	264.40	233.51	4534595.7	CLOSED	
15 EXTR	63.55	520.30	1292.84	139702.6	TD =	0.3
16 DRAIN	63.55	269.10	238.08	139702.6	DC =	4.7
					HEATER	3
20 FW IN	174.90	196.30	164.74	4534595.7	CLOSED	
18 EXTR	38.11	418.70	1245.78	282487.1	TD =	-0.1
19 DRAIN	38.11	205.50	173.68	422189.7	DC =	9.2
16 ENTRY	63.55	269.10	238.08	139702.6		
					HEATER	2
23 FW IN	174.90	160.60	128.97	4534595.7	CLOSED	
21 EXTR	11.09	236.80	1163.62	142423.2	TD =	1.8
22 DRAIN	11.09	168.10	136.08	564612.9	DC =	7.5
19 ENTRY	38.11	205.50	173.68	422189.7		

```
  TL            PRESS       TEMP       ENTH        FLOW


                                                          STM SEAL REG
 88  FLOW TO     0.          0.         0.        3936.1  CALCULATED
 70  TDV         3.15      651.90    1361.01      3821.2  TO HEATER
 68  TDV         0.29      480.00    1279.24       114.9 TO CONDENSER
    NOT CODED FOR MU     MEAS TOTAL FLOW =          0.

                                                         HEATER          1
 26 FW IN      222.70      129.70      98.21   4534595.7  CLOSED
 25 EXTR         4.88        0.      1091.45    117166.9  TD =         0.6
123 DRAIN        4.88      134.80     102.76    685601.1  DC =         5.1
 22 ENTRY       11.09      168.10     136.08    564612.9
 70 ENTRY        3.15      651.90    1361.01      3821.2

                                                          PUMP
 33  FW IN       0.          0.         0.     4644895.8
 87  LEAKAGE     0.          0.         0.          0.
 27  FW OUT       0.          0.         0.     4644895.8

                                                          FW TO BOILER


  1  FW IN    2762.80      551.90     548.78   6224686.7  S+L =   -4523.

                    T U R B I N E   E X P A N S I O N

                                                          MAIN STEAM LINE
 71 EXIT         0.          0.      1461.62        0.
 36 THROTTLE 2394.00     1000.80     1461.62   6220163.4

                                                          VALVE STEM LKG

                                                       SQRT P/V =   86.150
 37 LO NO  1   526.30      892.55    1461.62      2790.9  C =       55.578

                                                       SQRT P/V =   18.853
 38 LO NO  2     0.          0.         0.        1997.1  C =      105.928



                                                          EXP TO STG      1
 40 SHELL     1926.20      938.50    1437.26   6159186.8
112 EXTR         0.          0.      1437.26     56188.6

                                                         PACKING NO      2

                                                       SQRT P/V =.115E 19
 42 LO NO  1   123.86      688.00    1372.30     13628.6  C =        0.000

                                                       SQRT P/V =    4.770
 43 LO NO  2    15.20      686.10    1376.99      4032.0  C =      971.961

                                                       SQRT P/V =    0.582
100 LO NO  3     0.          0.         0.         604.5  C =     2057.052
```

TL	PRESS	TEMP	ENTH	FLOW	
					EXP TO STG 4
41 SHELL	1088.56	0.	1382.37	5560286.2	
79 EXTR	1075.10	794.20	1382.37	580635.6	
					PACKING NO 1
					SQRT P/V = 23.538
46 LO NO 1	122.51	605.70	1330.94	4483.2	C = 355.283
					SQRT P/V = 4.908
47 LO NO 2	15.09	584.70	1327.85	3275.0	C = 790.423
					SQRT P/V = 0.606
100 LO NO 3	0.	0.	0.	604.5	C = 2057.052
					EXPAND TO EXHAUST
49 EXH	571.20	623.00	1307.52	5590089.5	
80 EXTR	571.20	623.00	1307.52	551437.6	
50 TO RHT	571.20	623.00	1307.52	5038651.9	
					REHEATER 1
BEFORE LO	0.08	0.	1524.56	0.	
37 ENTRY					
84 AFTER LO	526.10	1009.20	1524.53	5041442.9	PCTDP = 7.896
					EXPAND TO BOWL
51 ENTRY	515.58	1007.97	1524.17	5059465.5	
125 ENTRY	533.80	822.60	1424.08	18022.6	
					EXP TO STG 11
52 SHELL	234.73	0.	1419.48	4825868.4	
53 EXTR	232.10	808.80	1428.70	233597.1	
					PACKING NO 3
					SQRT P/V = 4.720
57 LO NO 1	15.05	636.40	1352.81	1783.3	C = 1063.375
					SQRT P/V = 0.590
58 LO NO 2	15.08	647.70	1358.29	2027.1	C = 5488.745
					SQRT P/V = 0.588
100 LO NO 3	0.	0.	0.	604.5	C = 2057.052
					SQRT P/V = 0.
100 LO NO 4	0.	0.	0.	604.5	C = 2057.052

TL	PRESS	TEMP	ENTH	FLOW	
					EXPAND TO EXHAUST
56 EXH	118.90	623.60	1340.15	4304370.8	
55 EXTR	122.10	626.90	1341.60	516478.1	
					EXPAND TO BOWL
59 ENTRY	118.90	623.60	1340.15	4304370.8	
					EXP TO STG 15
61 SHELL	65.64	0.	1282.19	4164668.2	
60 EXTR	64.80	531.20	1298.10	139702.6	
					EXP TO STG 16
63 SHELL	39.97	0.	1237.49	3882181.1	
62 EXTR	39.42	426.70	1249.50	282487.1	
					EXP TO STG 18
65 SHELL	11.70	0.	1145.04	3739757.9	
64 EXTR	11.53	239.50	1164.76	142423.2	
					EXP TO STG 19
107 SHELL	5.03	0.	1092.13	3622591.0	
106 EXTR	4.97	0.	1091.45	117166.9	

TL	PRESS	TEMP	ENTH	FLOW	
					CONDENSER
					SHAFT 1
108 TB EXH	1.87	123.63	1045.2040	3622591.0	LEVL = -4823.0
76 ENTRY	0.	0.	0.	1017482.3	
122 DRAIN	0.	0.	0.	4644896.3	
					GENERATOR 1
					SHAFT 1

MEASURED LOAD = 859850.0 PF = 0.989 H2 = 64.00
SHAFT 1 KW = 871730.1 FL =4353.0 GL = 7527.1

TEST CYCLE HEAT BALANCE

P E R F O R M A N C E

TRUNKLINE OUTPUT

TL	P	T	H	Q	SV	SP	PV	TR
1	2762.8	551.9	548.8	6224687.	0.0212	0.	0.	-4523.3
2	1065.0	792.1	1381.6	580636.	0.6357	552.279	0.379	239.8
3	1065.0	486.3	471.8	580636.	0.0200	0.	7.200	0.
4	2762.8	479.1	463.9	6224687.	0.	0.	0.	0.
5	558.0	622.0	1308.0	551438.	1.0566	478.464	-0.636	143.5
6	558.0	404.0	379.8	1132073.	0.0187	0.	8.800	0.
7	2762.8	395.2	373.1	6224687.	0.	0.	0.	0.
8	230.3	807.2	1427.9	233597.	3.2174	393.810	-1.390	413.4
9	230.3	353.5	325.6	1365670.	0.0180	0.	7.700	0.
10	2911.5	345.8	321.9	6224687.	0.0177	0.	0.	0.
11	0.	0.	0.	6180137.	0.	0.	0.	0.
12	118.7	624.1	1340.4	280171.	5.3481	340.448	0.	283.7
13	127.9	296.2	265.9	4534595.	0.0174	0.	0.	0.
14	174.9	296.2	266.0	4534596.	0.0174	1.014	0.	174.9
15	63.6	520.3	1292.8	139703.	9.0660	296.486	0.286	223.8
16	63.6	269.1	238.1	139703.	0.0172	0.	4.700	0.
17	174.9	264.4	233.5	4534596.	0.	0.	0.	0.
18	38.1	418.7	1245.8	282487.	13.5632	264.340	-0.060	154.4
19	38.1	205.5	173.7	422190.	0.0167	0.	9.200	0.
20	174.9	196.3	164.7	4534596.	0.	0.	0.	0.
21	11.1	236.8	1163.6	142423.	37.0413	198.140	1.840	38.7
22	11.1	168.1	136.1	564613.	0.0164	0.	7.500	0.
23	174.9	160.6	129.0	4534596.	0.	0.	0.	0.
24	1500.0	295.4	267.7	0.	0.0173	0.	0.	0.
25	4.9	0.	1091.5	117167.	0.	161.176	0.576	-161.2
26	222.7	129.7	98.2	4534596.	0.0162	0.	0.	0.
27	0.	0.	0.	4644896.	0.	0.	0.	0.
28	0.	0.	0.	18646.	0.	0.	0.	0.
29	0.	0.	0.	47104.	0.	0.	0.	0.
30	0.	0.	0.	65750.	0.	0.	0.	0.
31	2923.9	333.9	309.7	0.	0.0176	0.	0.	0.
33	0.	0.	0.	4644896.	0.	0.	0.	0.
34	0.	0.	0.	-4523.	0.	0.	0.	0.
35	2911.5	345.8	321.9	6224687.	0.0177	0.	0.	0.
36	2394.0	1000.8	1461.6	6220163.	0.3226	1461.622	86.150	0.
37	526.3	892.6	1461.6	2791.	1.4807	0.780	18.853	55.6
38	0.	0.	0.	1997.	0.	0.	0.	105.9
39	2394.0	0.	1461.6	6215375.	0.3226	0.	86.150	0.
40	1926.2	938.5	1437.3	6159187.	0.3856	146.478	70.678	0.
41	1088.6	0.	1382.4	5560286.	0.6227	555.375	41.812	844.9
42	123.9	688.0	1372.3	13629.	5.4431	0.779	4.770	0.0
43	15.2	686.1	1377.0	4032.	44.8245	0.	0.582	972.0
45	0.	0.	0.	38166.	0.	0.	0.	0.
46	122.5	605.7	1330.9	4483.	5.0854	0.703	4.908	355.3
47	15.1	584.7	1327.8	3275.	41.1273	0.	0.606	790.4
48	0.	0.	0.	5598452.	0.	0.	0.	0.
49	571.2	623.0	1307.5	5590090.	1.0310	480.943	23.538	0.
50	571.2	623.0	1307.5	5038652.	0.	0.	0.	0.
51	515.6	1008.0	1524.2	5059466.	1.6573	0.	17.642	0.

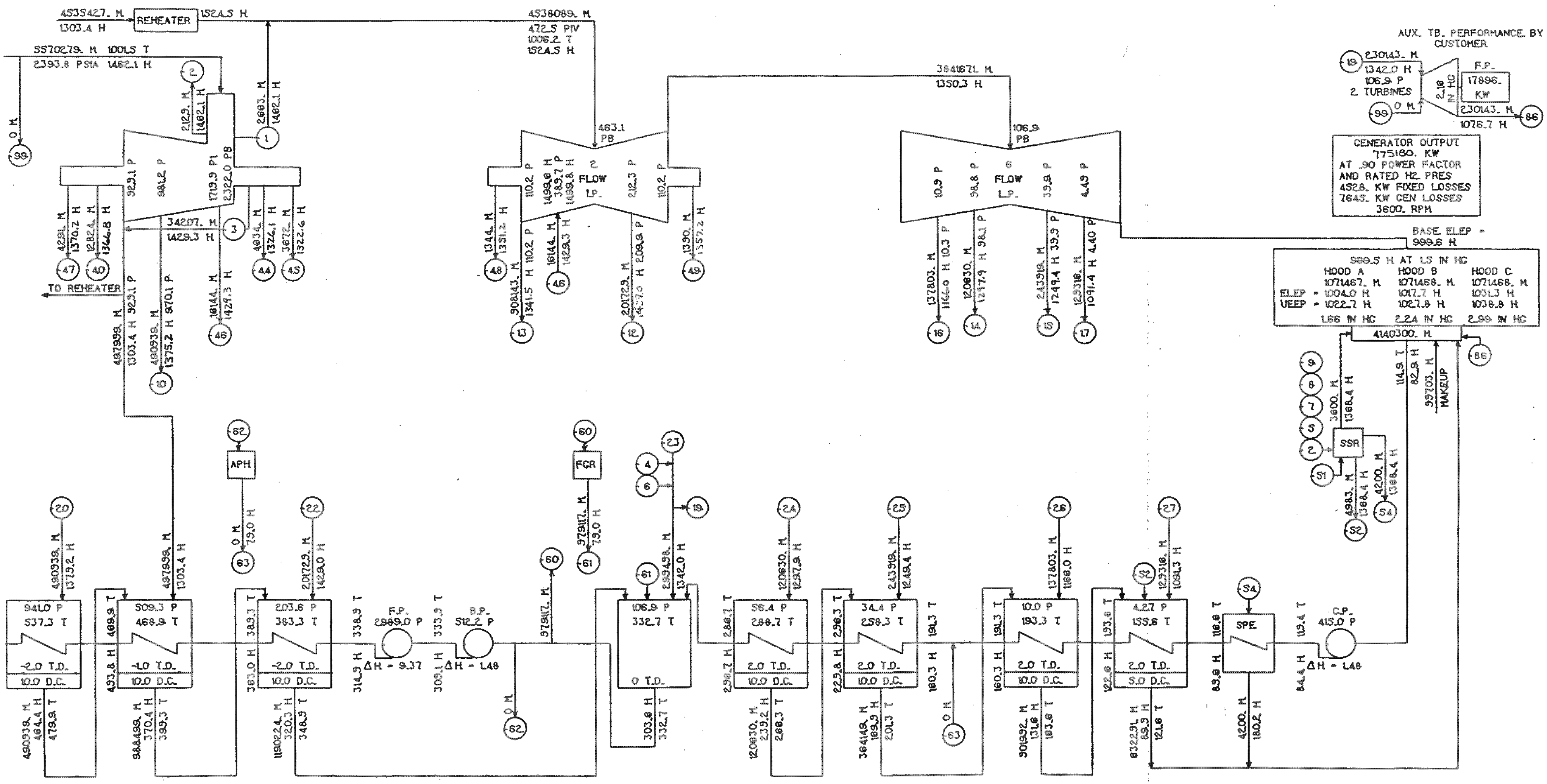
TL	P	T	H	Q	SV	SP	PV	TR
52	234.7	0.	1419.5	4825868.	3.1180	395.860	8.676	782.1
53	232.1	808.8	1428.7	233597.	3.1963	394.484	8.522	0.
54	118.9	623.6	1340.1	4820849.	5.3364	0.	4.720	0.
55	122.1	626.9	1341.6	516478.	5.2110	342.572	0.	0.
56	118.9	623.6	1340.1	4304371.	5.3364	340.575	0.	0.
57	15.0	636.4	1352.8	1783.	43.2953	0.	0.590	1063.4
58	15.1	647.7	1358.3	2027.	43.6577	0.	0.588	5488.7
59	118.9	623.6	1340.1	4304371.	5.3364	0.	4.720	0.
60	64.8	531.2	1298.1	139703.	8.9928	297.774	2.684	0.
61	65.6	0.	1282.2	4164668.	8.5857	298.730	2.765	1064.6
62	39.4	426.7	1249.5	282487.	13.2325	266.369	1.726	0.
63	40.0	0.	1237.5	3882181.	12.6906	267.383	1.775	1082.1
64	11.5	239.5	1164.8	142423.	35.7583	200.017	0.568	0.
65	11.7	0.	1145.0	3739758.	33.1685	201.139	0.594	1046.4
66	14.7	634.4	1351.9	9178.	44.1865	0.	0.	0.
67	118.7	343.2	1191.8	0.	3.7835	0.	0.	0.
68	0.3	480.0	1279.2	115.	1903.7423	0.	0.	0.
69	3.1	651.9	1361.0	1230.	210.3186	0.	0.	0.
70	3.1	651.9	1361.0	3821.	210.3186	0.	0.	0.
71	0.	0.	1461.6	0.	0.	0.	0.	0.
73	0.	0.	0.	-4823.	0.	0.	0.	0.
75	0.	0.	0.	5552.	0.	0.	0.	0.
76	0.	0.	0.	1017482.	0.	0.	0.	0.
79	1075.1	794.2	1382.4	580636.	0.6305	553.443	41.292	0.
80	571.2	623.0	1307.5	551438.	0.	0.	0.	0.
81	14.7	634.4	1351.9	0.	44.1865	0.	0.	0.
82	0.	0.	0.	5038652.	0.	0.	0.	0.
83	118.7	340.4	1190.2	300.	0.	0.	0.	0.
84	526.1	1009.2	1524.5	5041443.	1.6241	7.896	17.998	799.8
86	0.	0.	0.	110300.	0.	0.	0.	0.
88	0.	0.	0.	3936.	0.	0.	0.	0.
90	148.7	340.5	311.8	0.	0.0179	0.	0.	0.
91	139.3	234.7	203.3	910207.	0.0169	0.647	0.	139.3
95	1.9	123.6	1036.5	3622591.	170.8108	1045.204	3.809	515.2
99	0.	0.	0.	6650.	0.	0.	0.	0.
100	0.	0.	0.	604.	0.	0.	0.	2057.1
104	2762.8	551.9	548.8	6240937.	0.0212	1.028	0.	2762.8
106	5.0	0.	1091.5	117167.	71.0138	161.990	0.265	0.
107	5.0	0.	1092.1	3622591.	70.2487	0.	0.268	1119.5
108	1.9	123.6	1045.2	3622591.	185.0160	1045.204	3.809	-4823.0
109	0.	0.	276.7	2275877.	0.	0.	0.	0.
111	118.7	340.5	311.8	7090343.	3.7666	0.	-0.052	0.
112	0.	0.	1437.3	56189.	0.	0.	0.	0.
113	0.	0.	0.	6140922.	0.	0.	0.115E 19	0.
114	410.1	128.8	97.8	14783.	0.0162	0.624	0.	410.1
115	410.1	128.8	97.8	9013.	0.0162	0.624	0.	410.1
116	410.1	128.8	97.8	28198.	0.0162	0.623	0.	410.1
117	410.1	128.8	97.8	13915.	0.0162	0.660	0.	410.1
118	410.1	128.8	97.8	22392.	0.0162	0.660	0.	410.1
119	410.1	128.8	97.8	21999.	0.0162	0.660	0.	410.1
120	0.	0.	0.	4788.	0.	0.	0.	0.
122	0.	0.	0.	4644896.	0.	0.	0.	0.
123	4.9	134.8	102.8	685601.	0.0163	0.	5.100	0.
125	533.8	822.6	1424.1	18023.	1.3741	0.628	0.	519.8
130	0.	0.	0.	254419.	0.	0.	0.	0.
131	119.9	624.0	1340.3	124889.	5.2932	1.019	0.	119.9
132	119.7	623.7	1340.1	129531.	5.3006	1.019	0.	119.7
133	0.	0.	0.	253815.	0.	0.	0.	0.
201	0.1	0.	1524.6	0.	0.	217.041	0.	0.

FIG. 9D

TURBINE AND EXTRACTION ARRANGEMENT IS SCHEMATIC ONLY

CONTRACT CYCLE HEAT BALANCE TEST No.5

THE VALUE OF GENERATOR OUTPUT SHOWN ON THIS HEAT BALANCE IS AFTER ALL POWER FOR EXCITATION AND OTHER TURBINE-GENERATOR AUXILIARIES HAS BEEN DEDUCTED.



$$\text{POINT RATE} = \frac{4140300.\ (1.48) + 9970.3\ (719.6 - 533.2) + 5570279.\ (1462.1 - 533.2) + 4535427.\ (1524.5 - 1303.4)}{775180.} = 7977.7\ \frac{\text{BTU}}{\text{KW-HR}}$$

LEGEND - CALCULATIONS BASED ON 1967 ASME STEAM TABLES
M - FLOW-LB/HR
P - PRESSURE-PSIA
H - ENTHALPY-BTU/LB
T - TEMPERATURE-F DEGREES

9610T 1 0 1

KW / / IN HG ABS.
CONTRACT CYCLE HEAT BALANCE TEST NO.5
TCSF 30.0 IN. LSB 3600 RPM
2400.0 PSIA 1000. / 1000. T
GEN- 981000. KVA .90 PF LIQ

ERAL ELECTRIC COMPANY. SCHENECTADY N.Y.

TP-5

5/14/87

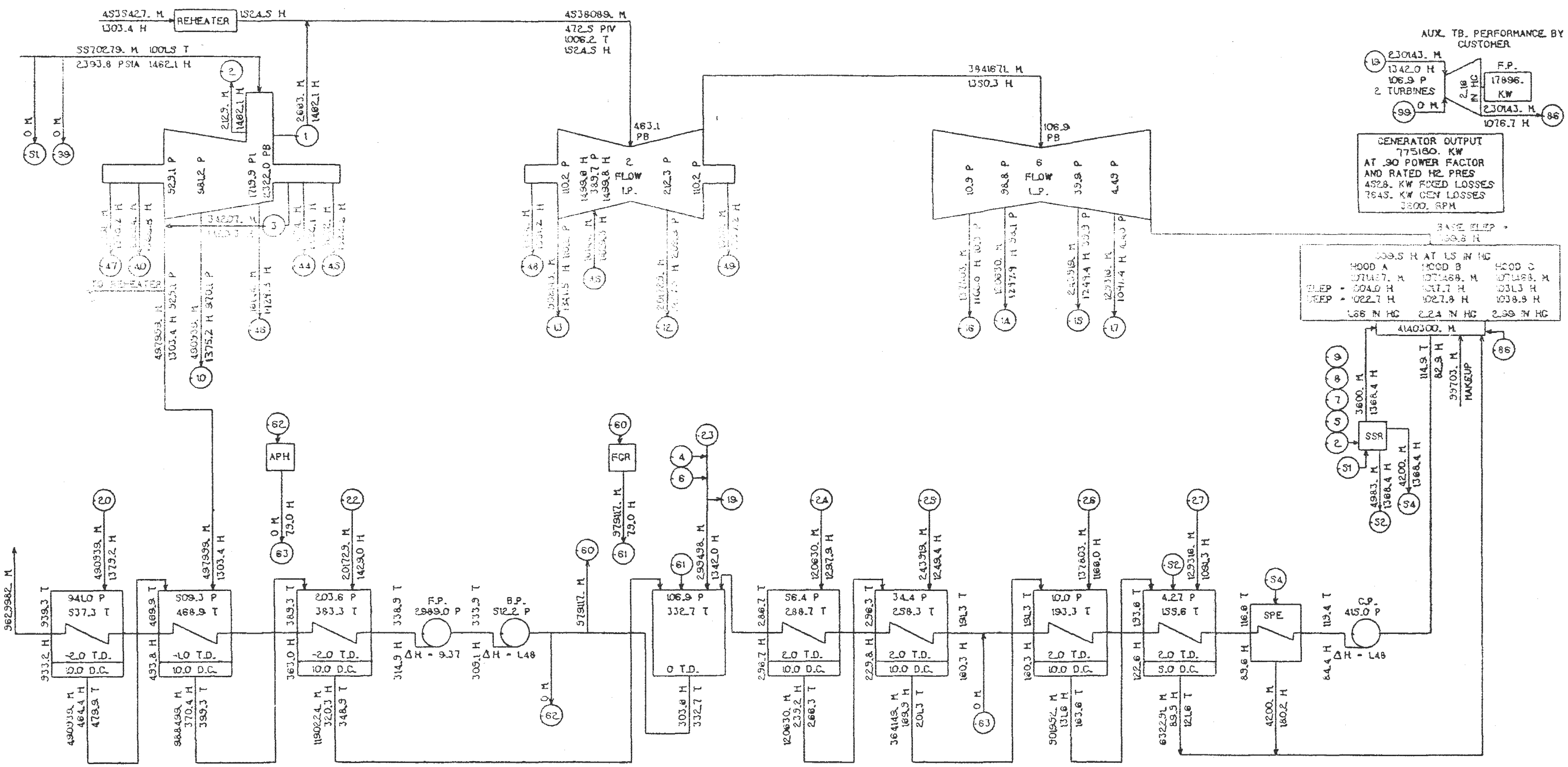
FIG. 9D

FIG. 9D

TURBINE AND EXTRACTION ARRANGEMENT IS SCHEMATIC ONLY

CONTRACT CYCLE HEAT BALANCE TEST No. 5

THE VALUE OF GENERATOR OUTPUT SHOWN ON THIS HEAT BALANCE IS AFTER ALL POWER FOR EXCITATION AND OTHER TURBINE-GENERATOR AUXILIARIES HAS BEEN DEDUCTED.



VALVE BEST POINT NET HEAT RATE

$$= \frac{4140300.\,(1.48) + 9970.3\,(719.6 - 533.2) + 5570279.\,(1462.1 - 533.2) + 4535427.\,(1524.5 - 1303.4)}{775180.} = 7977.7 \ \frac{\text{BTU}}{\text{KW-HR}}$$

LEGEND - CALCULATIONS BASED ON 1967 ASME STEAM TABLES
M - FLOW-LB/HR
P - PRESSURE-PSIA
H - ENTHALPY-BTU/LB
T - TEMPERATURE-F DEGREES

9610T 1 0 1

KW / / IN HG ABS.
CONTRACT CYCLE HEAT BALANCE TEST NO.5
TC6F 30.0 IN. LSB 3600 RPM
2400.0 PSIA 1000. / 1000. T
GEN- 981000. KVA .90 PF LIQ

GENERAL ELECTRIC COMPANY. SCHENECTADY N.Y.

3/14/87
Fig. 9D

TEST CYCLE HEAT BALANCE

VALVE POINT 3RD VL	05/14/87	TEST POINT 05
INTERMOUNTAIN PWR PROJECT		UNIT #2
820000. KW	TC6F-30 IN LSB	TURBINE NO 270T151
2400. PSIG	1000./ 1000. F	2.300 IN HG ABS

CALCULATED USING ASME STEAM TABLES

COMBINED TURBINE-CYCLE PERFORMANCE

	TEST CONDITIONS	* RATED CONDITIONS
TOTAL LOAD	785980.	785201.
HEAT RATE	7858.4	7866.2
THROTTLE FLOW	5570279.	5627468.

TURBINE THERMAL PERFORMANCE

	HIGH PRESS TB		REHEAT TB IP TB		LP TB
	THROTTLE	COLD RHT	INLET	EXH	EXH
PRESS	2393.80	514.80	475.00	107.50	3.403
TEMP	1001.50	606.10	1005.50	622.90	119.54
ENTH	1462.09	1301.65	1524.01	1340.52	1036.93
ENTR	1.5343		1.7452	1.7610	
EFF	86.181		91.583		93.569

ABSCISSA PHPX/PT=0.2151 P1STSTG/PT=0.7161 VAN= 522.6

THRU FLOW PERFORMANCE OF CONDENSING SECTION SHAFT NO 1

	TOTAL TB ENERGY BALANCE RHT TB	TOTAL TB ENERGY BALANCE LP TB	LP TB ENERGY BALANCE RHT TB	LP TB ENERGY BALANCE LP TB
AE	520.56	327.90		
H ELEP	1036.93		1036.93	
H UEEP	1045.45		1045.45	
EFF ELEP	93.57	92.59	93.57	92.59
EFF UEEP	91.93	89.99	91.93	89.99
VAN	522.60		522.60	

* LOAD AND HEAT RATE AT RATED POWER FACTOR AND H2 PRESS. FLOW AT RATED THROTTLE PRESS. OF 2412.2 PSIA AND TEMP. OF 1000 F.

A05-1

T G L PERFORMANCE OF CONDENSING SECTION　　　SHAFT NO 1

	TOTAL TB ENERGY BALANCE RHT TB	LP TB	LP TB ENERGY BALANCE RHT TB	LP TB
H ELEP	1039.18		1039.18	
H UEEP	1047.69		1047.69	
EFF ELEP	93.14	91.90	93.14	91.90
EFF UEEP	91.50	89.30	91.50	89.30
VAN	523.84		523.84	

STAGE FLOW FUNCTION

STG NO	SHELL PRESS	ONE VEL HD	PCT DELTA P	FLANGE PRESS	NOZ AREA	Q/AP H FLG	QFS	Q/AP H SHL
1	1714.30	0.	0.	0.	86.6	0.	5515140.	1005.3
4	975.78	3.487	1.13	964.80	157.4	846.4	4998137.	841.6
RH 1	475.00	0.	0.	0.	350.2	0.	4546814.	799.0
8	465.50	0.	0.	0.	350.2	0.	4562958.	818.0
11	211.53	0.727	1.10	209.20	711.2	792.6	4354230.	783.1
15	107.50	0.	0.	0.	807.6	0.	3898551.	1131.7
15	59.41	0.244	1.19	58.70	1414.8	1091.7	3776322.	1067.5
16	36.23	0.165	1.32	35.75	2021.4	1107.7	3526673.	1085.9
18	10.60	0.051	1.40	10.45	6018.0	1092.9	3400059.	1051.2
19	4.55	0.017	1.06	4.50	12096.0	1130.0	3296859.	1124.0

TL		PRESS	TEMP	ENTH	FLOW		

FEEDWATER CYCLE

TL		PRESS	TEMP	ENTH	FLOW		
						HEATER	8
4	FW IN	2679.90	469.20	452.85	5573373.4	CLOSED	
2	EXTR	955.00	771.40	1374.49	500222.7	TD =	-1.5
3	DRAIN	955.00	475.40	459.20	500222.7	DC =	6.2
						HEATER	7
7	FW IN	2679.90	387.20	364.57	5573373.4	CLOSED	
5	EXTR	503.00	605.10	1302.02	480036.8	TD =	-1.6
6	DRAIN	503.00	395.00	370.01	980259.6	DC =	7.8
3	ENTRY	955.00	475.40	459.20	500222.7		
						HEATER	6
10	FW IN	2826.30	337.80	313.50	5573373.4	CLOSED	
8	EXTR	207.70	805.10	1427.80	208728.4	TD =	-2.2
9	DRAIN	207.70	344.70	316.32	1188987.9	DC =	6.9
6	ENTRY	503.00	395.00	370.01	980259.6		
						PUMP	
11	FW IN	0.	0.	0.	5527238.3		
86	SEAL INJ	0.	0.	0.	109560.8		
30	SEAL RET	0.	0.	0.	63425.7		
32	LEAKAGE	0.	0.	0.	0.		
24	EXTR	1500.00	276.90	248.86	0.		
35	FW OUT	2826.30	337.80	313.50	5573373.4		
						HEATER	5
13	FW IN	116.40	290.10	259.64	4086605.4	OPEN	
12	EXTR	107.30	622.40	1340.28	252175.2	STO =	257.4
111	DRAIN	107.30	333.10	304.04	6488791.0	SC =	-0.1
109	ENTRY	0.	0.	267.06	2150540.7		
						HEATER	4
17	FW IN	161.80	259.00	228.00	4086606.2	CLOSED	
15	EXTR	57.64	519.10	1292.77	122229.4	TD =	0.0
16	DRAIN	57.64	263.10	231.95	122229.4	DC =	4.1
						HEATER	3
20	FW IN	161.80	191.90	160.29	4086606.2	CLOSED	
18	EXTR	34.52	418.00	1245.90	249649.0	TD =	-0.5
19	DRAIN	34.52	200.50	168.64	371878.4	DC =	8.6
16	ENTRY	57.64	263.10	231.95	122229.4		
						HEATER	2
23	FW IN	161.80	156.60	124.94	4086606.2	CLOSED	
21	EXTR	10.05	237.60	1164.34	126613.3	TD =	1.5
22	DRAIN	10.05	163.70	131.67	498491.7	DC =	7.1
19	ENTRY	34.52	200.50	168.64	371878.4		

TL		PRESS	TEMP	ENTH	FLOW	
						STM SEAL REG
88	FLOW TO	0.	0.	0.	3190.9	CALCULATED
70	TDV	4.54	676.10	1372.67	3190.9	TO HEATER
68	TDV	2.03	480.00	1279.07	0.	TO CONDENSER
	NOT CODED FOR MU		MEAS TOTAL FLOW =		0.	
						HEATER 1
26	FW IN	206.70	126.40	94.88	4086606.2	CLOSED
25	EXTR	4.42	0.	1092.40	103200.7	TD = 0.4
123	DRAIN	4.42	131.10	99.06	604883.3	DC = 4.7
22	ENTRY	10.05	163.70	131.67	498491.7	
70	ENTRY	4.54	676.10	1372.67	3190.9	
						PUMP
33	FW IN	0.	0.	0.	4196167.0	
87	LEAKAGE	0.	0.	0.	0.	
27	FW OUT	0.	0.	0.	4196167.0	
						FW TO BOILER
1	FW IN	2679.90	540.50	535.00	5573373.4	S+L = -3095.

T U R B I N E   E X P A N S I O N

TL		PRESS	TEMP	ENTH	FLOW	
						MAIN STEAM LINE
71	EXIT	0.	0.	1462.09	0.	
36	THROTTLE	2393.80	1001.50	1462.09	5570278.9	
						VALVE STEM LKG
					SQRT	P/V = 86.110
37	LO NO 1	475.20	890.02	1462.09	2650.5	C = 55.599
					SQRT	P/V = 17.013
38	LO NO 2	0.	0.	0.	2137.1	C = 125.620
						EXP TO STG 1
40	SHELL	1714.30	912.20	1428.45	5515140.0	
112	EXTR	0.	0.	1428.45	50351.2	
						PACKING NO 2
					SQRT	P/V =.115E 19
42	LO NO 1	112.39	674.00	1365.89	12404.9	C = 0.000
					SQRT	P/V = 4.353
43	LO NO 2	16.85	670.50	1369.29	3760.9	C = 1005.031
					SQRT	P/V = 0.650
100	LO NO 3	0.	0.	0.	614.5	C = 1879.144

TL	PRESS	TEMP	ENTH	FLOW	
					EXP TO STG 4
41 SHELL	975.78	0.	1374.59	4998137.0	
79 EXTR	964.80	772.40	1374.59	500222.7	
					PACKING NO 1
					SQRT P/V = 21.336
46 LO NO 1	111.24	592.80	1325.23	4437.6	C = 381.695
					SQRT P/V = 4.482
47 LO NO 2	16.79	572.30	1321.77	3091.7	C = 826.983
					SQRT P/V = 0.678
100 LO NO 3	0.	0.	0.	614.5	C = 1879.144
					EXPAND TO EXHAUST
49 EXH	514.80	606.10	1301.65	5024200.4	
80 EXTR	514.80	606.10	1301.65	480036.8	
50 TO RHT	514.80	606.10	1301.65	4544163.6	
					REHEATER 1
BEFORE LO	0.08	0.	1524.43	0.	
37 ENTRY					
84 AFTER LO	475.00	1006.20	1524.39	4546814.1	PCTDP = 7.731
					EXPAND TO BOWL
51 ENTRY	465.50	1004.99	1524.01	4562958.1	
125 ENTRY	481.83	808.00	1418.32	16144.0	
					EXP TO STG 11
52 SHELL	211.53	0.	1419.38	4354229.8	
53 EXTR	209.20	806.40	1428.41	208728.4	
					PACKING NO 3
					SQRT P/V = 4.266
57 LO NO 1	16.76	634.10	1351.60	1705.0	C = 1135.963
					SQRT P/V = 0.657
58 LO NO 2	16.77	646.40	1357.56	1911.6	C = 4777.700
					SQRT P/V = 0.654
100 LO NO 3	0.	0.	0.	614.5	C = 1879.144
					SQRT P/V = 0.
100 LO NO 4	0.	0.	0.	614.5	C = 1879.144

TL	PRESS	TEMP	ENTH	FLOW	
					EXPAND TO EXHAUST
56 EXH	107.50	622.90	1340.52	3898551.2	
55 EXTR	110.80	626.10	1341.91	450833.0	
					EXPAND TO BOWL
59 ENTRY	107.50	622.90	1340.52	3898551.2	
					EXP TO STG 15
61 SHELL	59.41	0.	1282.79	3776321.7	
60 EXTR	58.70	531.10	1298.56	122229.4	
					EXP TO STG 16
63 SHELL	36.23	0.	1238.23	3526672.8	
62 EXTR	35.75	426.50	1249.87	249649.0	
					EXP TO STG 18
65 SHELL	10.60	0.	1145.74	3400059.5	
64 EXTR	10.45	242.30	1166.43	126613.3	
					EXP TO STG 19
107 SHELL	4.55	0.	1092.98	3296858.8	
106 EXTR	4.50	0.	1092.40	103200.7	
					CONDENSER
					SHAFT 1
108 TB EXH	1.67	119.54	1045.4450	3296858.8	LEVL = -3624.8
76 ENTRY	0.	0.	0.	895683.4	
122 DRAIN	0.	0.	0.	4196166.9	
					GENERATOR 1
					SHAFT 1

MEASURED LOAD = 785980.0 PF = 1.000 H2 = 64.00
SHAFT 1 KW = 797091.0 FL =4353.0 GL = 6758.0

TEST CYCLE HEAT BALANCE

P E R F O R M A N C E

TRUNKLINE OUTPUT

TL	P	T	H	Q	SV	SP	PV	TR
1	2679.9	540.5	535.0	5573373.	0.0210	0.	0.	-3094.5
2	955.0	771.4	1374.5	500223.	0.7004	539.024	-1.476	232.4
3	955.0	475.4	459.2	500223.	0.0198	0.	6.200	0.
4	2679.9	469.2	452.8	5573373.	0.	0.	0.	0.
5	503.0	605.1	1302.0	480037.	1.1586	467.626	-1.574	137.5
6	503.0	395.0	370.0	980260.	0.0185	0.	7.800	0.
7	2679.9	387.2	364.6	5573373.	0.	0.	0.	0.
8	207.7	805.1	1427.8	208728.	3.5676	384.983	-2.217	420.1
9	207.7	344.7	316.3	1188988.	0.0179	0.	6.900	0.
10	2826.3	337.8	313.5	5573373.	0.0176	0.	0.	0.
11	0.	0.	0.	5527238.	0.	0.	0.	0.
12	107.3	622.4	1340.3	252175.	5.9163	332.958	257.400	289.4
13	116.4	290.1	259.6	4086605.	0.0174	0.	0.	0.
14	161.8	290.1	259.7	4086606.	0.0174	1.014	0.	161.8
15	57.6	519.1	1292.8	122229.	9.9952	290.101	0.001	229.0
16	57.6	263.1	232.0	122229.	0.0171	0.	4.100	0.
17	161.8	259.0	228.0	4086606.	0.	0.	0.	0.
18	34.5	418.0	1245.9	249649.	14.9788	258.473	-0.527	159.5
19	34.5	200.5	168.6	371878.	0.0166	0.	8.600	0.
20	161.8	191.9	160.3	4086606.	0.	0.	0.	0.
21	10.0	237.6	1164.3	126613.	40.9622	193.445	1.545	44.2
22	10.0	163.7	131.7	498492.	0.0164	0.	7.100	0.
23	161.8	156.6	124.9	4086606.	0.	0.	0.	0.
24	1500.0	276.9	248.9	0.	0.0171	0.	0.	0.
25	4.4	0.	1092.4	103201.	0.	157.046	0.446	-157.0
26	206.7	126.4	94.9	4086606.	0.0162	0.	0.	0.
27	0.	0.	0.	4196167.	0.	0.	0.	0.
28	0.	0.	0.	18171.	0.	0.	0.	0.
29	0.	0.	0.	45255.	0.	0.	0.	0.
30	0.	0.	0.	63426.	0.	0.	0.	0.
31	2833.0	303.5	278.5	0.	0.0173	0.	0.	0.
33	0.	0.	0.	4196167.	0.	0.	0.	0.
34	0.	0.	0.	-3095.	0.	0.	0.	0.
35	2826.3	337.8	313.5	5573373.	0.0176	0.	0.	0.
36	2393.8	1001.5	1462.1	5570279.	0.3228	1462.094	86.110	0.
37	475.2	890.0	1462.1	2650.	1.6419	0.780	17.013	55.6
38	0.	0.	0.	2137.	0.	0.	0.	125.6
39	2393.8	0.	1462.1	5565491.	0.3228	0.	86.110	0.
40	1714.3	912.2	1428.5	5515140.	0.4272	143.173	63.347	0.
41	975.8	0.	1374.6	4998137.	0.6855	542.134	37.730	841.6
42	112.4	674.0	1365.9	12405.	5.9298	0.779	4.353	0.0
43	16.8	670.5	1369.3	3761.	39.8733	0.	0.650	1005.0
45	0.	0.	0.	34207.	0.	0.	0.	0.
46	111.2	592.8	1325.2	4438.	5.5382	0.703	4.482	381.7
47	16.8	572.3	1321.8	3092.	36.5099	0.	0.678	827.0
48	0.	0.	0.	5032344.	0.	0.	0.	0.
49	514.8	606.1	1301.7	5024200.	1.1309	470.025	21.336	0.
50	514.8	606.1	1301.7	4544164.	0.	0.	0.	0.
51	465.5	1005.0	1524.0	4562958.	1.8358	0.	15.928	0.

TL	P	T	H	Q	SV	SP	PV	TR
52	211.5	0.	1419.4	4354230.	3.4608	386.937	7.818	783.1
53	209.2	806.4	1428.4	208728.	3.5455	385.592	7.681	0.
54	107.5	622.9	1340.5	4349384.	5.9080	0.	4.266	0.
55	110.8	626.1	1341.9	450833.	5.7472	335.322	0.	0.
56	107.5	622.9	1340.5	3898551.	5.9080	333.095	0.	0.
57	16.8	634.1	1351.6	1705.	38.7868	0.	0.657	1136.0
58	16.8	646.4	1357.6	1912.	39.2031	0.	0.654	4777.7
59	107.5	622.9	1340.5	3898551.	5.9080	0.	4.266	0.
60	58.7	531.1	1298.6	122229.	9.9384	291.284	2.430	0.
61	59.4	0.	1282.8	3776322.	9.5024	292.221	2.500	1067.5
62	35.8	426.5	1249.9	249649.	14.6044	260.537	1.565	0.
63	36.2	0.	1238.2	3526673.	14.0353	261.582	1.607	1085.9
64	10.5	242.3	1166.4	126613.	39.6572	195.297	0.513	0.
65	10.6	0.	1145.7	3400059.	36.6907	196.413	0.537	1051.2
66	16.5	624.4	1346.9	9415.	39.0946	0.	0.	0.
67	107.3	335.8	1190.1	0.	4.1644	0.	0.	0.
68	2.0	480.0	1279.1	0.	276.2814	0.	0.	0.
69	4.5	676.1	1372.7	750.	148.8754	0.	0.	0.
70	4.5	676.1	1372.7	3191.	148.8754	0.	0.	0.
71	0.	0.	1462.1	0.	0.	0.	0.	0.
72	0.	0.	0.	257.	0.	0.	0.	0.
73	0.	0.	0.	-3625.	0.	0.	0.	0.
75	0.	0.	0.	5728.	0.	0.	0.	0.
76	0.	0.	0.	895683.	0.	0.	0.	0.
79	964.8	772.4	1374.6	500223.	0.6934	540.251	37.303	0.
80	514.8	606.1	1301.7	480037.	0.	0.	0.	0.
81	16.5	624.4	1346.9	0.	39.0946	0.	0.	0.
82	0.	0.	0.	4544164.	0.	0.	0.	0.
83	107.3	333.0	1188.4	273.	0.	0.	0.	0.
84	475.0	1006.2	1524.4	4546814.	1.7990	7.731	16.249	799.0
86	0.	0.	0.	109561.	0.	0.	0.	0.
88	0.	0.	0.	3191.	0.	0.	0.	0.
90	137.3	333.1	304.1	0.	0.0178	0.	0.	0.
91	131.7	237.5	206.1	961553.	0.0169	0.647	0.	131.7
95	1.7	119.5	1036.9	3296859.	190.3695	1045.445	3.403	522.6
99	0.	0.	0.	6760.	0.	0.	0.	0.
100	0.	0.	0.	615.	0.	0.	0.	1879.1
104	2679.9	540.5	535.0	5578025.	0.0210	1.028	0.	2679.9
106	4.5	0.	1092.4	103201.	78.1635	157.828	0.240	0.
107	4.5	0.	1093.0	3296859.	77.3689	0.	0.242	1124.0
108	1.7	119.5	1045.4	3296859.	205.7008	1045.445	3.403	-3624.8
109	0.	0.	267.1	2150541.	0.	0.	0.	0.
111	107.3	333.1	304.0	6488791.	4.1459	0.	-0.142	0.
112	0.	0.	1428.5	50351.	0.	0.	0.	0.
113	0.	0.	0.	5498360.	0.	0.	0.115E 19	0.
114	434.6	125.1	94.2	14857.	0.0162	0.624	0.	434.6
115	434.6	125.1	94.2	8663.	0.0162	0.624	0.	434.6
116	434.6	125.1	94.2	27616.	0.0162	0.623	0.	434.6
117	434.6	125.1	94.2	15126.	0.0162	0.660	0.	434.6
118	434.6	125.1	94.2	21097.	0.0162	0.660	0.	434.6
119	434.6	125.1	94.2	22202.	0.0162	0.660	0.	434.6
120	0.	0.	0.	4788.	0.	0.	0.	0.
122	0.	0.	0.	4196167.	0.	0.	0.	0.
123	4.4	131.1	99.1	604883.	0.0163	0.	4.700	0.
125	481.8	808.0	1418.3	16144.	1.5086	0.628	0.	469.5
130	0.	0.	0.	215500.	0.	0.	0.	0.
131	108.3	622.4	1340.2	105879.	5.8608	1.018	0.	108.3
132	108.5	622.1	1340.1	109621.	5.8481	1.019	0.	108.5
133	0.	0.	0.	214886.	0.	0.	0.	0.
201	0.1	0.	1524.4	0.	0.	222.775	0.	0.

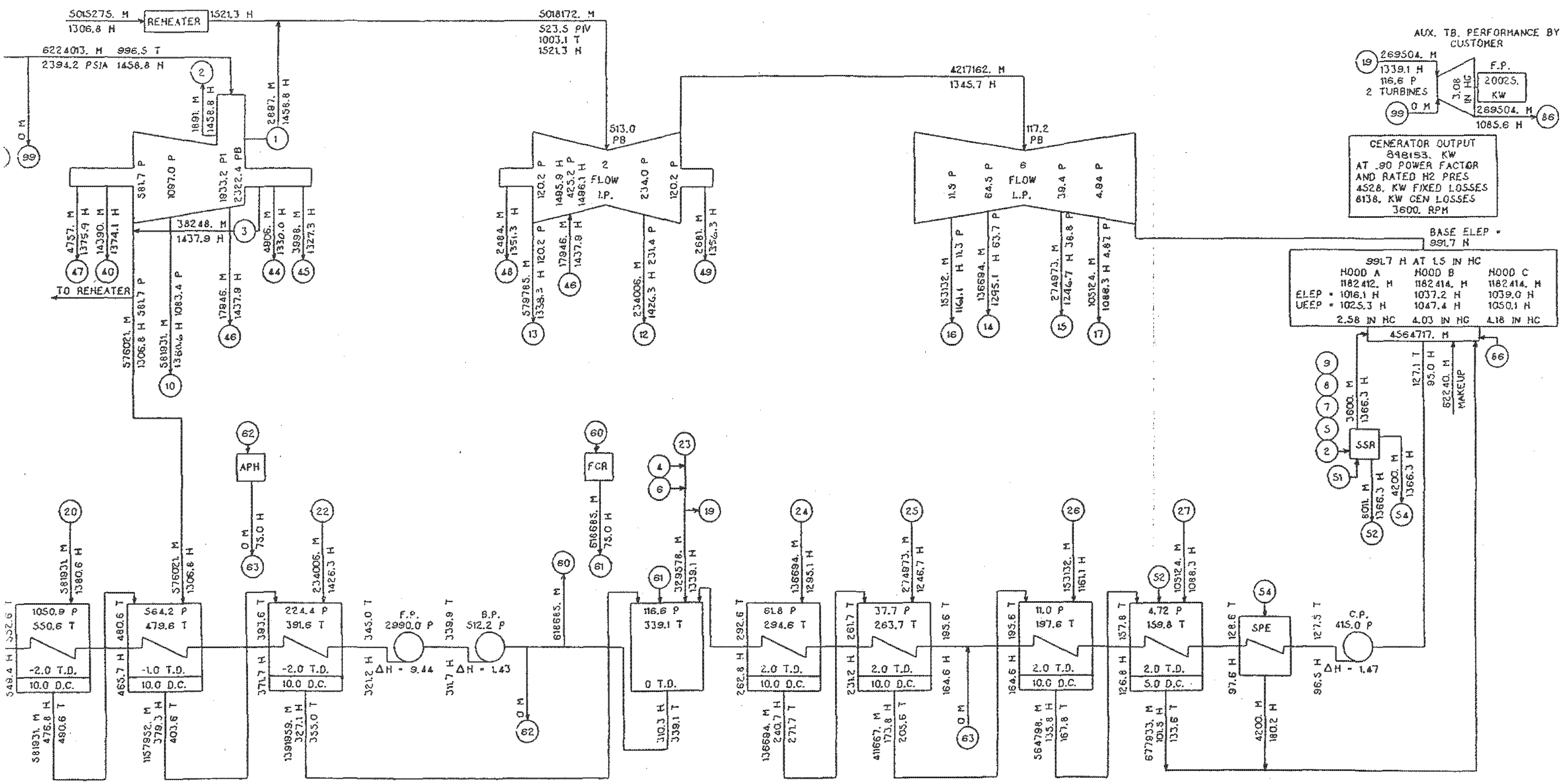
FIG. 9E

TURBINE AND EXTRACTION ARRANGEMENT IS SCHEMATIC ONLY

CALCULATED DATA - NOT GUARANTEED

CONTRACT CYCLE HEAT BALANCE TEST No. 6

RATING FLOW IS 5963946. M AT INLET STEAM CONDITIONS OF 2412.2 PSIA AND 1000.0 T TO ASSURE THAT THE TURBINE WILL PASS THIS FLOW, CONSIDERING VARIATIONS IN FLOW COEFFICIENTS FROM EXPECTED VALUES, SHOP TOLERANCES ON DRAWING AREAS, ETC. WHICH MAY AFFECT THE FLOW, THE TURBINE IS BEING DESIGNED FOR A DESIGN FLOW (RATING FLOW PLUS 5.0 PERCENT) OF 6262143. M
THE EQUIVALENT DESIGN FLOW AT 2394.2 PSIA AND 996.5 T IS 6223999. M .
THE VALUE OF GENERATOR OUTPUT SHOWN ON THIS HEAT BALANCE IS AFTER ALL POWER FOR EXCITATION AND OTHER TURBINE-GENERATOR AUXILIARIES HAS BEEN DEDUCTED.



$$\text{HEAT POINT RATE} = \frac{\begin{array}{l}4564717. \ (1.47) \\ + 6224.0 \ (719.6 - 549.4) \\ + 6224013. \ (1458.8 - 549.4) \\ + 5015275. \ (1521.3 - 1306.8)\end{array}}{848153.} = 7951.3 \ \frac{\text{BTU}}{\text{KW-HR}}$$

LEGEND - CALCULATIONS BASED ON 1967 ASME STEAM TABLES
M - FLOW-LB/HR
P - PRESSURE-PSIA
H - ENTHALPY-BTU/LB
T - TEMPERATURE-F DEGREES

9613T 1 0 1

KW / / IN HG ABS.
CONTRACT CYCLE HEAT BALANCE TEST NO.6
TC6F 30.0 IN. LSB 3600 RPM
2400.0 PSIA 1000. / 1000. T
GEN- 991000. KVA .90 PF LIQ

TP-6 FIG. 9E

GENERAL ELECTRIC COMPANY, SCHENECTADY N.Y.

5/14/87

FIG. 9E

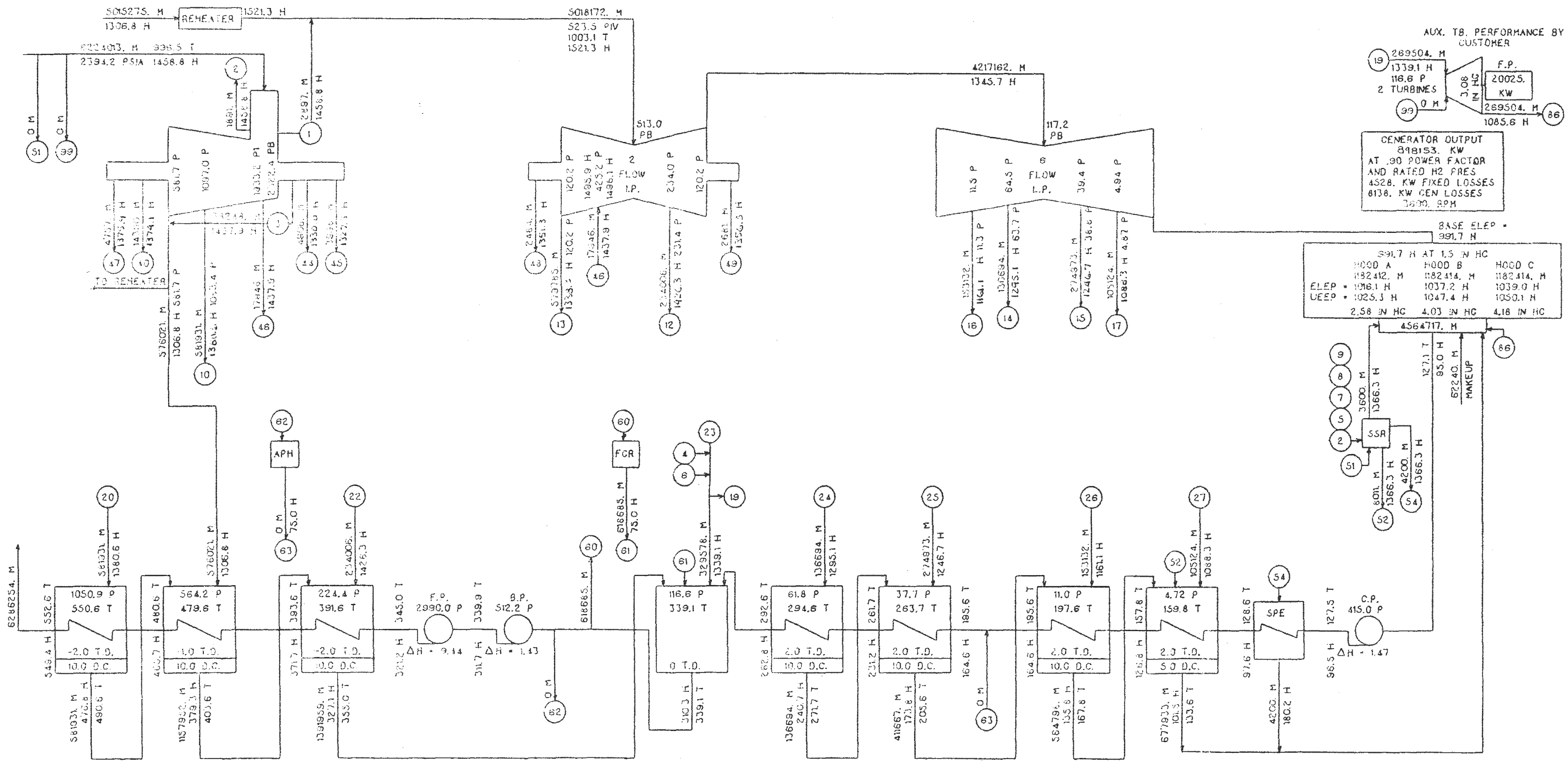
TURBINE AND EXTRACTION ARRANGEMENT IS SCHEMATIC ONLY

CALCULATED DATA - NOT GUARANTEED

CONTRACT CYCLE HEAT BALANCE TEST No. 6

RATING FLOW IS 5963946. M AT INLET STEAM CONDITIONS OF 2412.2 PSIA AND 1000.0 T TO ASSURE THAT THE TURBINE WILL PASS THIS FLOW, CONSIDERING VARIATIONS IN FLOW COEFFICIENTS FROM EXPECTED VALUES, SHOP TOLERANCES ON DRAWING AREAS, ETC. WHICH MAY AFFECT THE FLOW, THE TURBINE IS BEING DESIGNED FOR A DESIGN FLOW (RATING FLOW PLUS 5.0 PERCENT) OF 6262143. M THE EQUIVALENT DESIGN FLOW AT 2394.2 PSIA AND 996.5 T IS 6223999. M

THE VALUE OF GENERATOR OUTPUT SHOWN ON THIS HEAT BALANCE IS AFTER ALL POWER FOR EXCITATION AND OTHER TURBINE-GENERATOR AUXILIARIES HAS BEEN DEDUCTED.



VALVE BEST POINT NET HEAT RATE $= \dfrac{4564717.\,(1.47) + 6224.0\,(719.6 - 549.4) + 6224013.\,(1456.8 - 549.4) + 5015275.\,(1521.3 - 1306.8)}{848153.} = 7951.3\ \dfrac{\text{BTU}}{\text{KW-HR}}$

LEGEND - CALCULATIONS BASED ON 1967 ASME STEAM TABLES
- M - FLOW-LB/HR
- P - PRESSURE-PSIA
- H - ENTHALPY-BTU/LB
- T - TEMPERATURE-F DEGREES

9613T 1 0 1

KW / / IN HG ABS.
CONTRACT CYCLE HEAT BALANCE TEST NO.6
TC6F 30.0 IN. LSB 3600 RPM
2400.0 PSIA 1000. / 1000. T
GEN- 991000. KVA .90 PF L10

Fig. 9E

GENERAL ELECTRIC COMPANY, SCHENECTADY N.Y.

5/14/87

IP14_004969

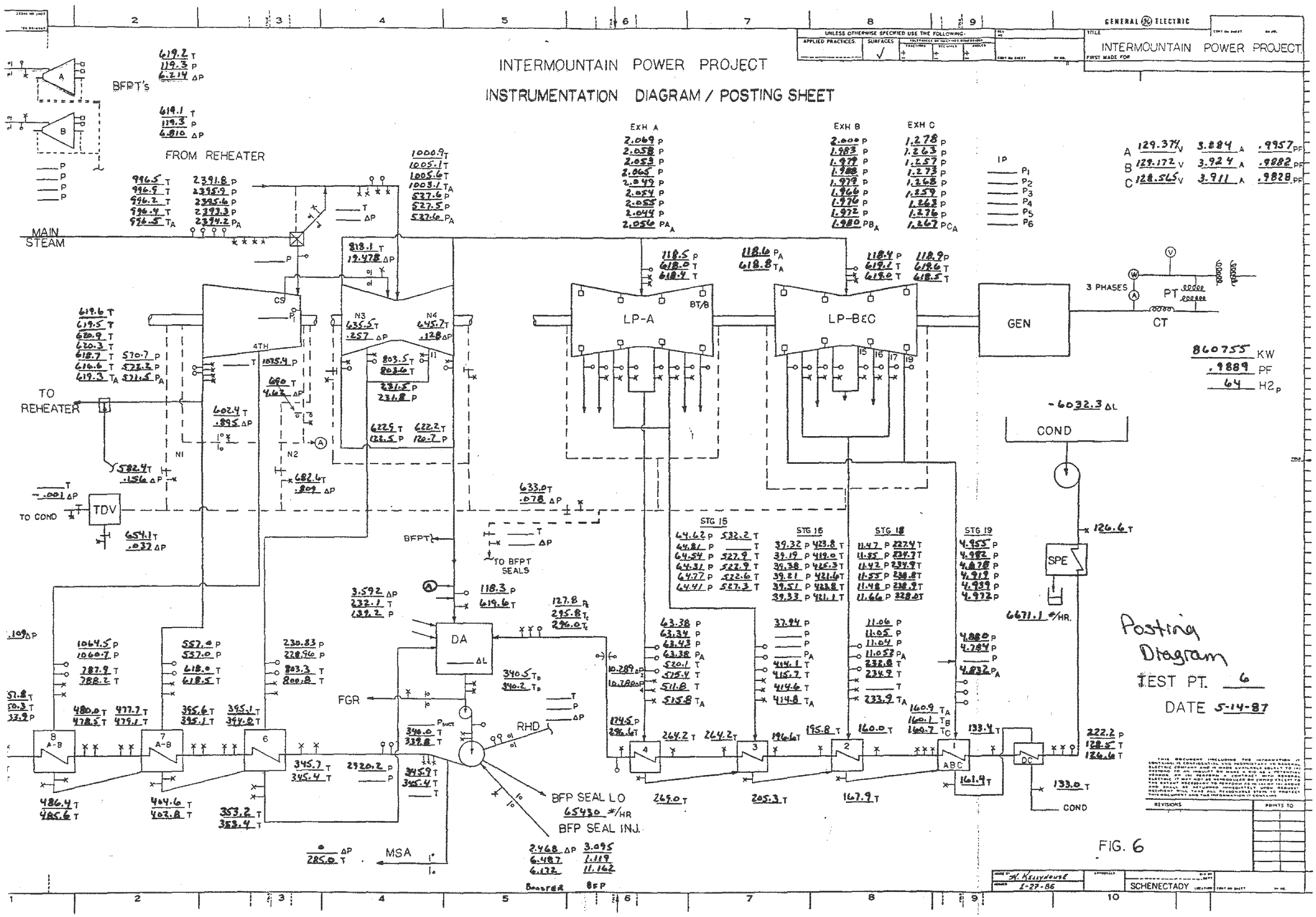
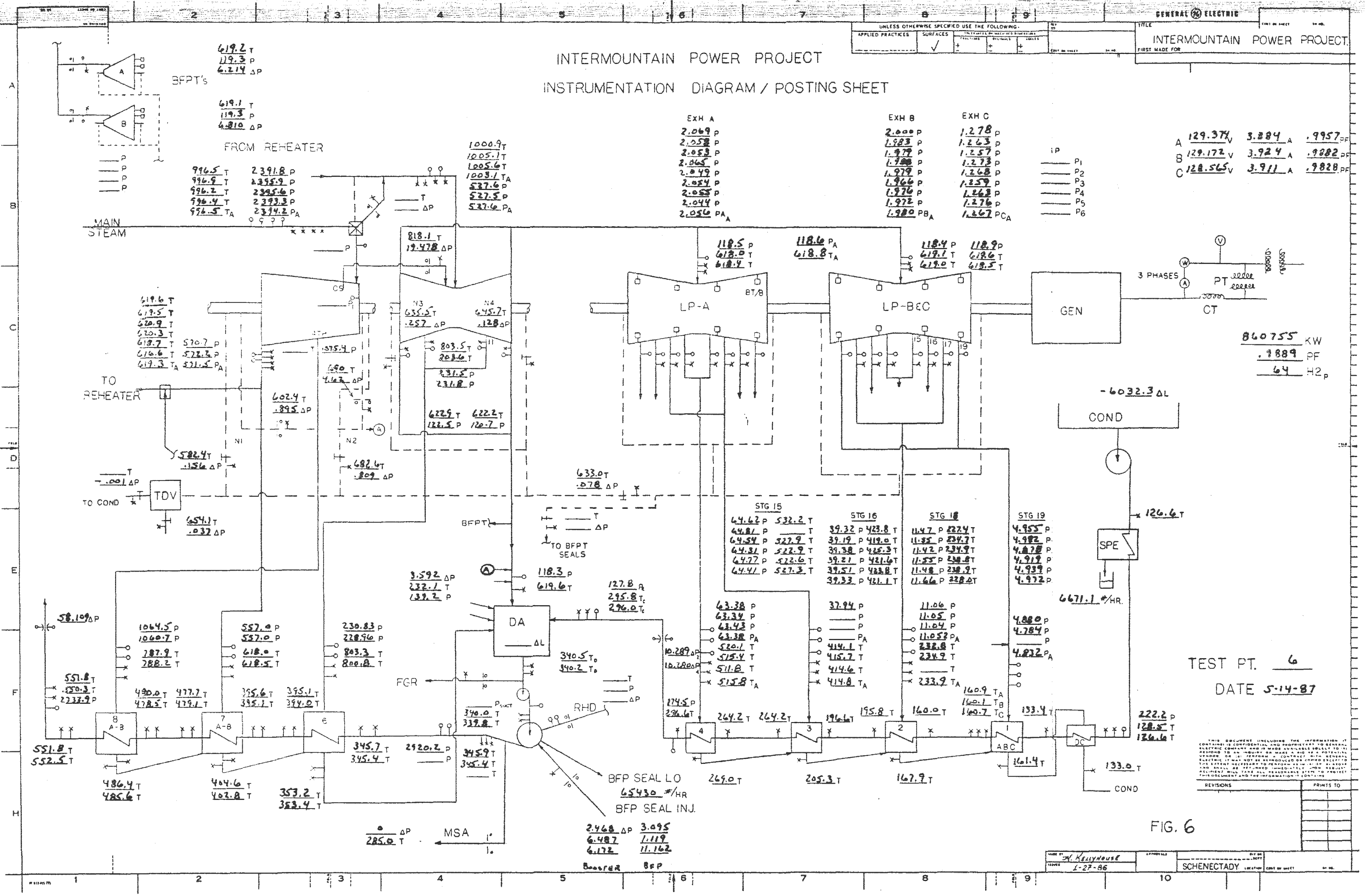
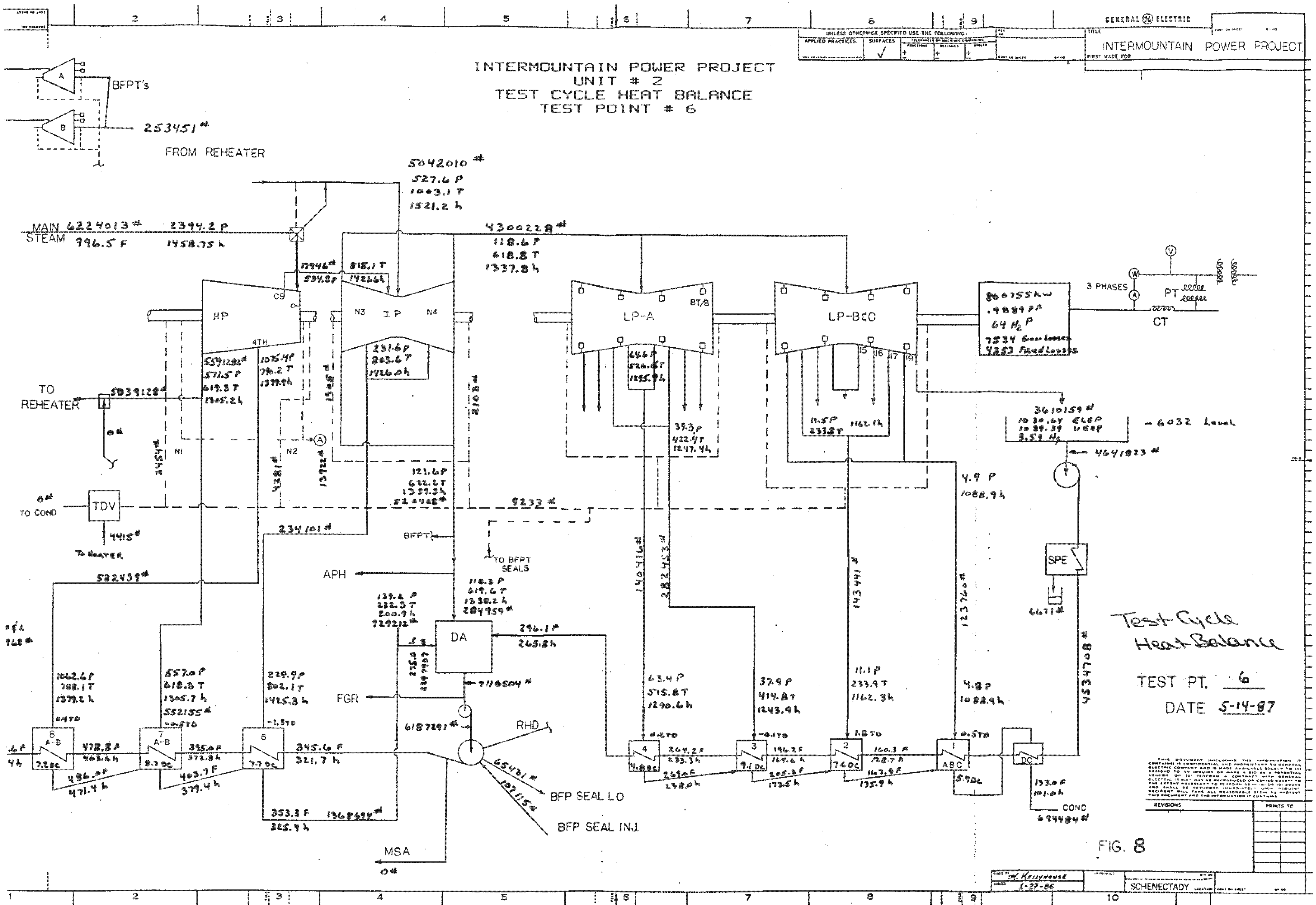


FIG. 6

IP14_004970



INTERMOUNTAIN POWER PROJECT
INSTRUMENTATION DIAGRAM / POSTING SHEET
GENERAL ELECTRIC
INTERMOUNTAIN POWER PROJECT
SCHENECTADY
BFPT's
FROM REHEATER
MAIN STEAM
TO REHEATER
TDV
TO COND
EXH A
EXH B
EXH C
LP-A
LP-B&C
GEN
3 PHASES
PT
CT
COND
SPE
DA
FGR
RHD
MSA
BFPT
TO BFPT SEALS
BFP SEAL LO
BFP SEAL INJ.
STG 15
STG 16
STG 18
STG 19
TEST PT. 6
DATE 5-14-87
FIG. 6



INTERMOUNTAIN POWER PROJECT
UNIT # 2
TEST CYCLE HEAT BALANCE
TEST POINT # 6
GENERAL ELECTRIC
INTERMOUNTAIN POWER PROJECT
BFPT's
253451#
FROM REHEATER
5042010#
527.6 P
1003.1 T
1521.2 h
MAIN STEAM
6224013#
996.5 F
2394.2 P
1458.75 h
4300228#
118.6 P
618.8 T
1337.8 h
17946#
534.8 P
818.1 T
142664
HP
CS
4TH
N3
IP
N4
LP-A
LP-B&C
BT/B
864755 KW
.9889 PF
64 H2 P
7534 Gen Losses
4353 Fixed Losses
3 PHASES
PT
CT
TO REHEATER
5839128#
5591282#
571.5 P
619.3 T
1305.2 h
1075.4 P
790.2 T
1379.4 h
231.6 P
803.6 T
1426.0 h
64.6 P
526.6 T
1295.9 h
39.3 P
422.4 T
1247.4 h
11.5 P
2338 T
1162.1 h
3610159#
6032 Level
4641823#
4.9 P
1088.9 h
TDV
0# TO COND
4415#
To Heater
9233#
121.6 P
622.2 T
1337.3 h
520408#
234101#
BFPT
TO BFPT SEALS
582439#
APH
118.3 P
619.6 T
1338.2 h
284959#
139.4 P
232.3 T
200.9 h
929212#
DA
296.1 F
265.8 h
7116504#
FGR
RHD
6187291#
1404116#
2824453#
1433441#
123766#
4534708#
SPE
6671#
1062.6 P
788.1 T
1379.2 h
557.0 P
618.3 T
1305.7 h
552155#
229.9 P
802.1 T
1425.3 h
63.4 P
515.8 T
1290.6 h
37.9 P
414.8 T
1243.9 h
11.1 P
233.9 T
1162.3 h
4.8 P
1088.9 h
478.8 F
463.6 h
395.0 F
372.8 h
345.6 F
321.7 h
486.0 F
471.4 h
403.7 F
379.4 h
353.3 F
325.9 h
1368694#
264.2 F
233.3 h
249.0 F
238.0 h
196.2 F
164.6 h
205.3 F
173.5 h
160.3 F
128.7 h
167.9 F
135.9 h
133.0 F
101.0 h
COND
694484#
DC
BFP SEAL L.O.
BFP SEAL INJ.
65431#
107115#
MSA
0#
Test Cycle Heat Balance
TEST PT. 6
DATE 5-14-87
SCHENECTADY
1-27-86

FIG. 8

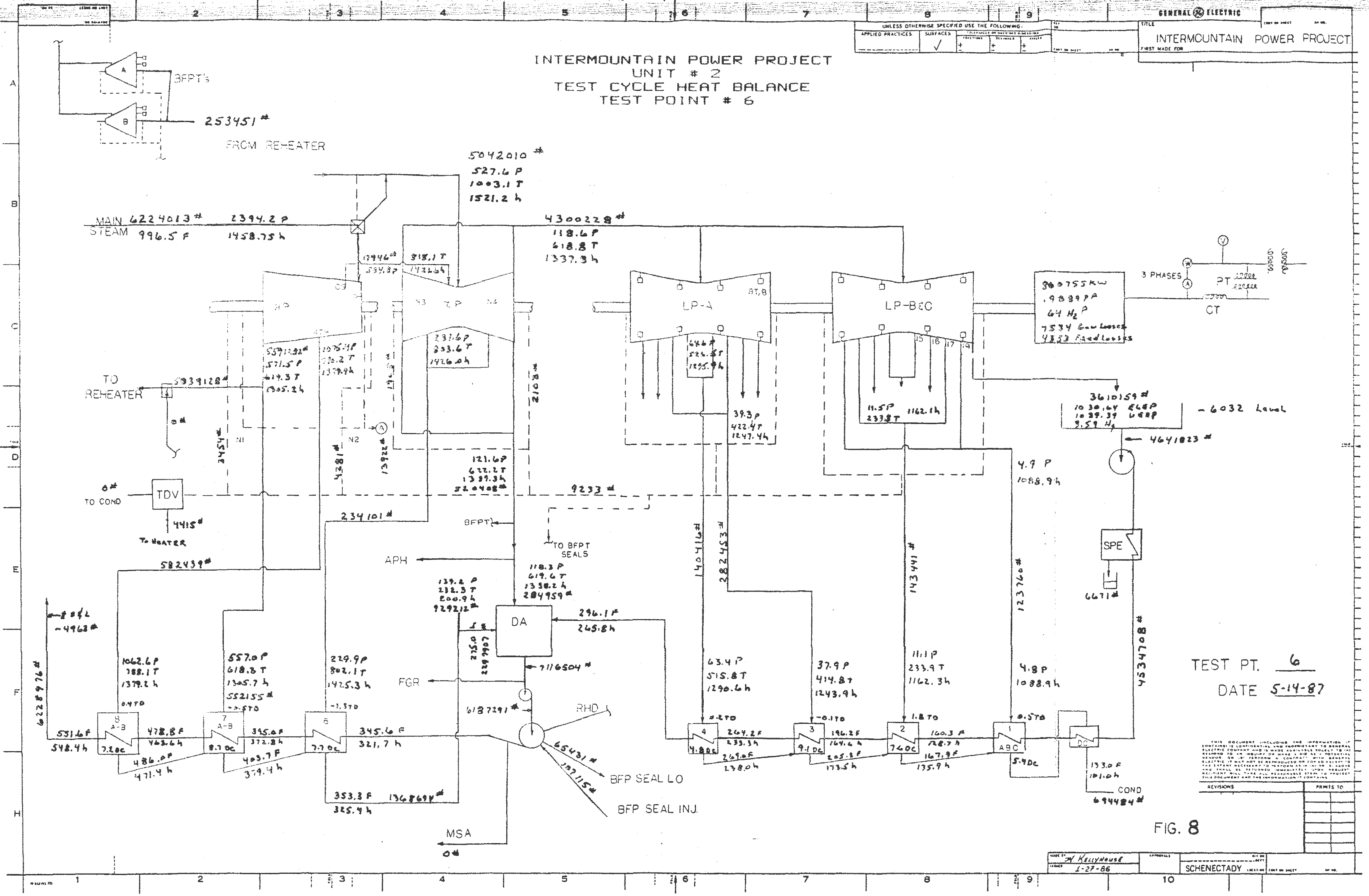


FIG. 8

IP14_004973

TEST CYCLE HEAT BALANCE

VALVE POINT VWO	05/14/87	TEST POINT 06
INTERMOUNTAIN PWR PROJECT		UNIT #2
820000. KW	TC6F-30 IN LSB	TURBINE NO 270T151
2400. PSIG	1000./ 1000. F	2.300 IN HG ABS

CALCULATED USING ASME STEAM TABLES

COMBINED TURBINE-CYCLE PERFORMANCE

	TEST CONDITIONS	* RATED CONDITIONS
TOTAL LOAD	860755.	859887.
HEAT RATE	7847.1	7855.0
THROTTLE FLOW	6224013.	6269949.

TURBINE THERMAL PERFORMANCE

	HIGH PRESS TB		REHEAT TB IP TB		LP TB
	THROTTLE	COLD RHT	INLET	EXH	EXH
PRESS	2394.20	571.50	527.60	118.60	3.599
TEMP	996.50	619.30	1002.45	618.80	121.56
ENTH	1458.75	1305.18	1520.83	1337.76	1031.30
ENTR	1.5320		1.7317	1.7478	
EFF	88.016		91.464		93.775

ABSCISSA PHPX/PT=0.2387 P1STSTG/PT=0.8050 VAN= 539.1

THRU FLOW PERFORMANCE OF CONDENSING SECTION SHAFT NO 1

	TOTAL TB ENERGY BALANCE RHT TB	LP TB	LP TB ENERGY BALANCE RHT TB	LP TB
AE	522.03	329.59		
H ELEP	1031.30		1031.30	
H UEEP	1039.33		1039.33	
EFF ELEP	93.77	92.98	93.77	92.98
EFF UEEP	92.24	90.54	92.24	90.54
VAN	539.15		539.15	

* LOAD AND HEAT RATE AT RATED POWER FACTOR AND H2 PRESS. FLOW AT RATED THROTTLE PRESS. OF 2412.2 PSIA AND TEMP. OF 1000 F.

A06-1

IP14_004974

T G L PERFORMANCE OF CONDENSING SECTION SHAFT NO 1

	TOTAL TB ENERGY BALANCE RHT TB	LP TB	LP TB ENERGY BALANCE RHT TB	LP TB
H ELEP	1033.75		1033.75	
H UEEP	1041.79		1041.79	
EFF ELEP	93.31	92.24	93.31	92.24
EFF UEEP	91.77	89.80	91.77	89.80
VAN	540.55		540.55	

STAGE FLOW FUNCTION

STG NO	SHELL PRESS	ONE VEL HD	PCT DELTA P	FLANGE PRESS	NOZ AREA	Q/AP H FLG	QFS	Q/AP H SHL
1	1927.30	0.	0.	0.	86.6	0.	6162994.	1003.8
4	1088.87	4.278	1.24	1075.40	157.4	848.2	5561745.	842.9
RH 1	527.60	0.	0.	0.	350.2	0.	5041928.	795.8
8	517.05	0.	0.	0.	350.2	0.	5059875.	814.8
11	234.23	0.822	1.12	231.60	711.2	791.8	4825774.	781.3
15	118.60	0.	0.	0.	807.6	0.	4300146.	1128.2
15	65.42	0.291	1.29	64.58	1414.8	1089.3	4159730.	1063.0
16	39.88	0.190	1.39	39.33	2021.4	1103.3	3877277.	1079.3
18	11.69	0.059	1.45	11.52	6018.0	1081.0	3733837.	1044.3
19	5.01	0.022	1.26	4.94	12096.0	1126.0	3610182.	1118.8

F E E D W A T E R   C Y C L E

TL	PRESS	TEMP	ENTH	FLOW		
					HEATER	8
4 FW IN	2733.90	478.80	463.56	6228975.6	CLOSED	
2 EXTR	1062.60	788.10	1379.22	582439.2	TD =	0.4
3 DRAIN	1062.60	486.00	471.41	582439.2	DC =	7.2
					HEATER	7
7 FW IN	2733.90	395.00	372.85	6228975.6	CLOSED	
5 EXTR	557.00	618.30	1305.74	552154.5	TD =	-0.5
6 DRAIN	557.00	403.70	379.43	1134593.8	DC =	8.7
3 ENTRY	1062.60	486.00	471.41	582439.2		
					HEATER	6
10 FW IN	2908.20	345.60	321.66	6228975.6	CLOSED	
8 EXTR	229.90	802.10	1425.33	234100.5	TD =	-1.3
9 DRAIN	229.90	353.30	325.37	1368694.3	DC =	7.7
6 ENTRY	557.00	403.70	379.43	1134593.8		
					PUMP	
11 FW IN	0.	0.	0.	6187291.2		
86 SEAL INJ	0.	0.	0.	107115.2		
30 SEAL RET	0.	0.	0.	65430.7		
32 LEAKAGE	0.	0.	0.	0.		
24 EXTR	1500.00	220.20	191.69	0.		
35 FW OUT	2908.20	345.60	321.66	6228975.6		
					HEATER	5
13 FW IN	127.80	296.10	265.82	4534707.4	OPEN	
12 EXTR	118.30	619.60	1338.18	284958.8	STO =	769.6
111 DRAIN	118.30	340.40	311.68	7116503.7	SC =	-0.2
109 ENTRY	0.	0.	275.04	2297906.8		
					HEATER	4
17 FW IN	174.50	264.20	233.31	4534707.8	CLOSED	
15 EXTR	63.38	515.80	1290.64	140416.3	TD =	0.2
16 DRAIN	63.38	269.00	237.97	140416.3	DC =	4.8
					HEATER	3
20 FW IN	174.50	196.20	164.64	4534707.8	CLOSED	
18 EXTR	37.94	414.80	1243.90	282452.6	TD =	-0.1
19 DRAIN	37.94	205.30	173.48	422868.9	DC =	9.1
16 ENTRY	63.38	269.00	237.97	140416.3		
					HEATER	2
23 FW IN	174.50	160.30	128.67	4534707.8	CLOSED	
21 EXTR	11.05	233.90	1162.26	143440.6	TD =	1.8
22 DRAIN	11.05	167.90	135.88	566309.5	DC =	7.6
19 ENTRY	37.94	205.30	173.48	422868.9		

```
  TL            PRESS       TEMP       ENTH        FLOW


                                                         STM SEAL REG
 88  FLOW TO     0.          0.         0.        4497.0  CALCULATED
 70  TDV         5.03      654.10    1361.97      4497.0  TO HEATER
 68  TDV         2.12      480.00    1279.06         0.   TO CONDENSER
   NOT CODED FOR MU     MEAS TOTAL FLOW =          0.

                                                        HEATER          1
 26 FW IN      222.20     127.60       96.11   4534707.8  CLOSED
 25 EXTR         4.83       0.       1088.93    123654.9  TD =        0.5
123 DRAIN        4.83     133.00      100.96    694461.4  DC =        5.4
 22 ENTRY       11.05     167.90      135.88    566309.5
 70 ENTRY        5.03     654.10     1361.97      4497.0

                                                         PUMP
 33  FW IN       0.          0.         0.     4641822.9
 87  LEAKAGE     0.          0.         0.           0.
 27  FW OUT       0.          0.         0.     4641822.9

                                                         FW TO BOILER

  1  FW IN    2733.90     551.60      548.44   6228975.6  S+L =   -4963.


                         T U R B I N E   E X P A N S I O N

                                                         MAIN STEAM LINE
 71 EXIT         0.          0.      1458.75         0.
 36 THROTTLE 2394.20      996.50     1458.75   6224012.6

                                                         VALVE STEM LKG

                                                      SQRT P/V =   86.356
 37 LO NO   1  527.80     887.33     1458.75      2800.9  C =      55.449

                                                      SQRT P/V =   18.949
 38 LO NO   2    0.          0.         0.        1987.5  C =     104.887


                                                         EXP TO STG      1
 40 SHELL     1927.30     934.00     1434.28   6162994.1
112 EXTR         0.          0.      1434.28     56230.2

                                                        PACKING NO      2

                                                      SQRT P/V =.115E 19
 42 LO NO   1  123.45     690.00     1373.33     13922.1  C =       0.000

                                                      SQRT P/V =    4.750
 43 LO NO   2   17.08     682.60     1375.18      4281.1  C =    1028.969

                                                      SQRT P/V =    0.655
100 LO NO   3    0.          0.         0.         606.4  C =    1834.023
```

TL	PRESS	TEMP	ENTH	FLOW	
					EXP TO STG 4
41 SHELL	1088.87	0.	1379.87	5561745.3	
79 EXTR	1075.40	790.20	1379.87	582439.2	
					PACKING NO 1
					SQRT P/V = 23.609
46 LO NO 1	122.05	602.40	1329.31	4686.3	C = 370.502
					SQRT P/V = 4.898
47 LO NO 2	16.96	582.40	1326.61	3454.4	C = 829.131
					SQRT P/V = 0.682
100 LO NO 3	0.	0.	0.	606.4	C = 1834.023
					EXPAND TO EXHAUST
49 EXH	571.50	619.30	1305.18	5591282.1	
80 EXTR	571.50	619.30	1305.18	552154.5	
50 TO RHT	571.50	619.30	1305.18	5039127.5	
					REHEATER 1
BEFORE LO	0.08	0.	1521.22	0.	
37 ENTRY					
84 AFTER LO	527.60	1003.10	1521.18	5041928.4	PCTDP = 7.682
					EXPAND TO BOWL
51 ENTRY	517.05	1001.87	1520.83	5059874.8	
125 ENTRY	534.80	818.10	1421.60	17946.4	
					EXP TO STG 11
52 SHELL	234.23	0.	1415.77	4825774.3	
53 EXTR	231.60	803.60	1426.04	234100.5	
					PACKING NO 3
					SQRT P/V = 4.719
57 LO NO 1	16.95	635.50	1352.26	1904.7	C = 1106.108
					SQRT P/V = 0.664
58 LO NO 2	16.95	645.70	1357.21	2102.6	C = 4990.290
					SQRT P/V = 0.661
100 LO NO 3	0.	0.	0.	606.4	C = 1834.023
					SQRT P/V = 0.
100 LO NO 4	0.	0.	0.	606.4	C = 1834.023

TL	PRESS	TEMP	ENTH	FLOW	
					EXPAND TO EXHAUST
56 EXH	118.60	618.80	1337.76	4300146.2	
55 EXTR	121.60	622.20	1339.27	520407.8	
					EXPAND TO BOWL
59 ENTRY	118.60	618.80	1337.76	4300146.2	
					EXP TO STG 15
61 SHELL	65.42	0.	1278.95	4159729.9	
60 EXTR	64.58	526.60	1295.85	140416.3	
					EXP TO STG 16
63 SHELL	39.88	0.	1234.56	3877277.3	
62 EXTR	39.33	422.40	1247.42	282452.6	
					EXP TO STG 18
65 SHELL	11.69	0.	1142.71	3733836.7	
64 EXTR	11.52	233.80	1162.06	143440.6	
					EXP TO STG 19
107 SHELL	5.01	0.	1089.63	3610181.8	
106 EXTR	4.94	0.	1088.93	123654.9	

TL	PRESS	TEMP	ENTH	FLOW	
					CONDENSER
					SHAFT 1
108 TB EXH	1.77	121.56	1039.3263	3610181.8	LEVL = -6032.3
76 ENTRY	0.	0.	0.	1025609.2	
122 DRAIN	0.	0.	0.	4641823.3	
					GENERATOR 1
					SHAFT 1

MEASURED LOAD = 860755.0 PF = 0.989 H2 = 64.00
SHAFT 1 KW = 872642.3 FL =4353.0 GL = 7534.3

TEST CYCLE HEAT BALANCE

P E R F O R M A N C E

TRUNKLINE OUTPUT

TL	P	T	H	Q	SV	SP	PV	TR
1	2733.9	551.6	548.4	6228976.	0.0212	0.	0.	-4963.0
2	1062.6	788.1	1379.2	582439.	0.6343	552.001	0.401	236.1
3	1062.6	486.0	471.4	582439.	0.0200	0.	7.200	0.
4	2733.9	478.8	463.6	6228976.	0.	0.	0.	0.
5	557.0	618.3	1305.7	552155.	1.0535	478.275	-0.525	140.0
6	557.0	403.7	379.4	1134594.	0.0187	0.	8.700	0.
7	2733.9	395.0	372.8	6228976.	0.	0.	0.	0.
8	229.9	802.1	1425.3	234101.	3.2092	393.660	-1.340	408.4
9	229.9	353.3	325.4	1368694.	0.0180	0.	7.700	0.
10	2908.2	345.6	321.7	6228976.	0.0177	0.	0.	0.
11	0.	0.	0.	6187291.	0.	0.	0.	0.
12	118.3	619.6	1338.2	284959.	5.3428	340.195	769.600	279.4
13	127.8	296.1	265.8	4534707.	0.0174	0.	0.	0.
14	174.5	296.1	265.9	4534708.	0.0174	1.014	0.	174.5
15	63.4	515.8	1290.6	140416.	9.0467	296.309	0.209	219.5
16	63.4	269.0	238.0	140416.	0.0172	0.	4.800	0.
17	174.5	264.2	233.3	4534708.	0.	0.	0.	0.
18	37.9	414.8	1243.9	282453.	13.5611	264.072	-0.128	150.7
19	37.9	205.3	173.5	422869.	0.0167	0.	9.100	0.
20	174.5	196.2	164.6	4534708.	0.	0.	0.	0.
21	11.1	233.9	1162.3	143441.	37.0078	197.975	1.775	35.9
22	11.1	167.9	135.9	566310.	0.0164	0.	7.600	0.
23	174.5	160.3	128.7	4534708.	0.	0.	0.	0.
24	1500.0	220.2	191.7	0.	0.0167	0.	0.	0.
25	4.8	0.	1088.9	123655.	0.	160.795	0.495	-160.8
26	222.2	127.6	96.1	4534708.	0.0162	0.	0.	0.
27	0.	0.	0.	4641823.	0.	0.	0.	0.
28	0.	0.	0.	18500.	0.	0.	0.	0.
29	0.	0.	0.	46930.	0.	0.	0.	0.
30	0.	0.	0.	65431.	0.	0.	0.	0.
31	2920.2	285.0	259.9	0.	0.0171	0.	0.	0.
33	0.	0.	0.	4641823.	0.	0.	0.	0.
34	0.	0.	0.	-4963.	0.	0.	0.	0.
35	2908.2	345.6	321.7	6228976.	0.0177	0.	0.	0.
36	2394.2	996.5	1458.8	6224013.	0.3210	1458.752	86.356	0.
37	527.8	887.3	1458.8	2801.	1.4699	0.780	18.949	55.4
38	0.	0.	0.	1988.	0.	0.	0.	104.9
39	2394.2	0.	1458.8	6219224.	0.3210	0.	86.356	0.
40	1927.3	934.0	1434.3	6162994.	0.3834	145.752	70.896	0.
41	1088.9	0.	1379.9	5561745.	0.6196	555.410	41.920	842.9
42	123.4	690.0	1373.3	13922.	5.4716	0.779	4.750	0.0
43	17.1	682.6	1375.2	4281.	39.7595	0.	0.655	1029.0
45	0.	0.	0.	38284.	0.	0.	0.	0.
46	122.0	602.4	1329.3	4686.	5.0881	0.703	4.898	370.5
47	17.0	582.4	1326.6	3454.	36.5003	0.	0.682	829.1
48	0.	0.	0.	5600029.	0.	0.	0.	0.
49	571.5	619.3	1305.2	5591282.	1.0253	480.999	23.609	0.
50	571.5	619.3	1305.2	5039128.	0.	0.	0.	0.
51	517.0	1001.9	1520.8	5059875.	1.6450	0.	17.733	0.

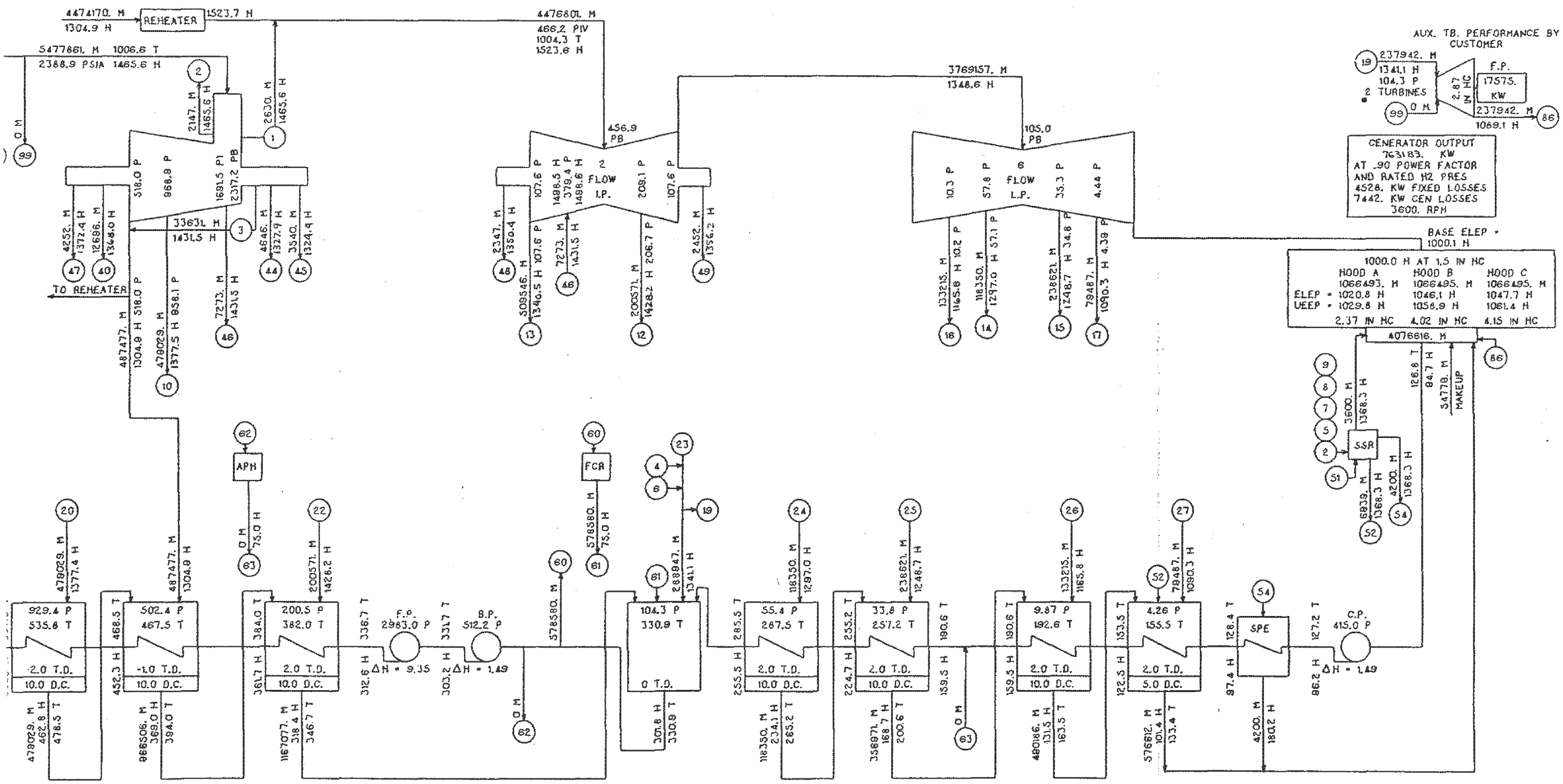
TL	P	T	H	Q	SV	SF	PV	TR
52	234.2	0.	1415.8	4825774.	3.1054	395.673	8.685	781.3
53	231.6	803.6	1426.0	234101.	3.1892	394.297	8.522	0.
54	118.6	618.8	1337.8	4820554.	5.3248	0.	4.719	0.
55	121.6	622.2	1339.3	520408.	5.2086	342.262	0.	0.
56	118.6	618.8	1337.8	4300146.	5.3248	340.385	0.	0.
57	17.0	635.5	1352.3	1905.	38.4006	0.	0.664	1106.1
58	17.0	645.7	1357.2	2103.	38.7611	0.	0.661	4990.3
59	118.6	618.8	1337.8	4300146.	5.3249	0.	4.719	0.
60	64.6	526.6	1295.9	140416.	8.9798	297.549	2.682	0.
61	65.4	0.	1278.9	4159730.	8.5519	298.504	2.766	1063.0
62	39.3	422.4	1247.4	282453.	13.1955	266.231	1.726	0.
63	39.9	0.	1234.6	3877277.	12.6280	267.246	1.777	1079.3
64	11.5	233.8	1162.1	143441.	35.4836	199.975	0.570	0.
65	11.7	0.	1142.7	3733837.	33.1151	201.097	0.594	1044.3
66	16.6	633.0	1351.1	9233.	39.1454	0.	0.	0.
67	118.3	343.1	1191.9	0.	3.7967	0.	0.	0.
68	2.1	480.0	1279.1	0.	264.2691	0.	0.	0.
69	5.0	654.1	1362.0	1533.	131.7884	0.	0.	0.
70	5.0	654.1	1362.0	4497.	131.7884	0.	0.	0.
71	0.	0.	1458.8	0.	0.	0.	0.	0.
72	0.	0.	0.	770.	0.	0.	0.	0.
73	0.	0.	0.	-6032.	0.	0.	0.	0.
75	0.	0.	0.	5595.	0.	0.	0.	0.
76	0.	0.	0.	1025609.	0.	0.	0.	0.
79	1075.4	790.2	1379.9	582439.	0.6275	553.477	41.399	0.
80	571.5	619.3	1305.2	552155.	0.	0.	0.	0.
81	16.6	633.0	1351.1	0.	39.1454	0.	0.	0.
82	0.	0.	0.	5039128.	0.	0.	0.	0.
83	118.3	340.2	1190.1	300.	0.	0.	0.	0.
84	527.6	1003.1	1521.2	5041928.	1.6120	7.682	18.091	795.8
86	0.	0.	0.	107115.	0.	0.	0.	0.
88	0.	0.	0.	4497.	0.	0.	0.	0.
90	148.3	340.4	311.7	0.	0.0179	0.	0.	0.
91	139.2	232.3	200.9	929212.	0.0169	0.647	0.	139.2
95	1.8	121.6	1031.3	3610182.	179.3530	1039.326	3.599	539.1
99	0.	0.	0.	6671.	0.	0.	0.	0.
100	0.	0.	0.	606.	0.	0.	0.	1834.0
104	2733.9	551.6	548.4	6248749.	0.0212	1.028	0.	2733.9
106	4.9	0.	1088.9	123655.	71.2111	161.752	0.263	0.
107	5.0	0.	1089.6	3610182.	70.3504	0.	0.267	1118.8
108	1.8	121.6	1039.3	3610182.	195.1488	1039.326	3.599	-6032.3
109	0.	0.	275.0	2297907.	0.	0.	0.	0.
111	118.3	340.4	311.7	7116504.	3.7797	0.	-0.205	0.
112	0.	0.	1434.3	56230.	0.	0.	0.	0.
113	0.	0.	0.	6144185.	0.	0.	0.115E 19	0.
114	411.8	126.6	95.6	14773.	0.0162	0.624	0.	411.8
115	411.8	126.6	95.6	8886.	0.0162	0.624	0.	411.8
116	411.8	126.6	95.6	28048.	0.0162	0.623	0.	411.8
117	411.8	126.6	95.6	13189.	0.0162	0.660	0.	411.8
118	411.8	126.6	95.6	21372.	0.0162	0.660	0.	411.8
119	411.8	126.6	95.6	20847.	0.0162	0.660	0.	411.8
120	0.	0.	0.	4788.	0.	0.	0.	0.
122	0.	0.	0.	4641823.	0.	0.	0.	0.
123	4.8	133.0	101.0	694461.	0.0163	0.	5.400	0.
125	534.8	818.1	1421.6	17946.	1.3659	0.628	0.	521.0
130	0.	0.	0.	254057.	0.	0.	0.	0.
131	119.3	619.2	1337.9	124258.	5.2952	1.019	0.	119.3
132	119.3	619.1	1337.9	129800.	5.2946	1.019	0.	119.3
133	0.	0.	0.	253451.	0.	0.	0.	0.
201	0.1	0.	1521.2	0.	0.	216.039	0.	0.

FIG. 9F

CONTRACT CYCLE HEAT BALANCE TEST No.7

TURBINE AND EXTRACTION ARRANGEMENT IS SCHEMATIC ONLY

THE VALUE OF GENERATOR OUTPUT SHOWN ON THIS HEAT BALANCE IS AFTER ALL POWER FOR EXCITATION AND OTHER TURBINE-GENERATOR AUXILIARIES HAS BEEN DEDUCTED.



$$\text{NET HEAT RATE} = \frac{\begin{array}{l} 4076616.\ (1.49) \\ +5477.9\ (719.0 - 531.5) \\ +5477861.\ (1465.6 - 531.5) \\ +4474170.\ (1523.7 - 1304.9) \end{array}}{763183.} = 7996.9\ \frac{BTU}{KW\text{-}HR}$$

LEGEND - CALCULATIONS BASED ON 1967 ASME STEAM TABLES
M - FLOW-LB/HR
P - PRESSURE-PSIA
H - ENTHALPY-BTU/LB
T - TEMPERATURE-F DEGREES

9619T 1 0 1

KW / / IN HC ABS.
CONTRACT CYCLE HEAT BALANCE TEST NO.7
TC6F 30.0 IN. LSB 3600 RPM
2400.0 PSIA 1000. / 1000. T
GEN- 991000. KVA .90 PF LIQ

ERAL ELECTRIC COMPANY. SCHENECTADY N.Y.

TP-7

5/14/87
FIG. 9F

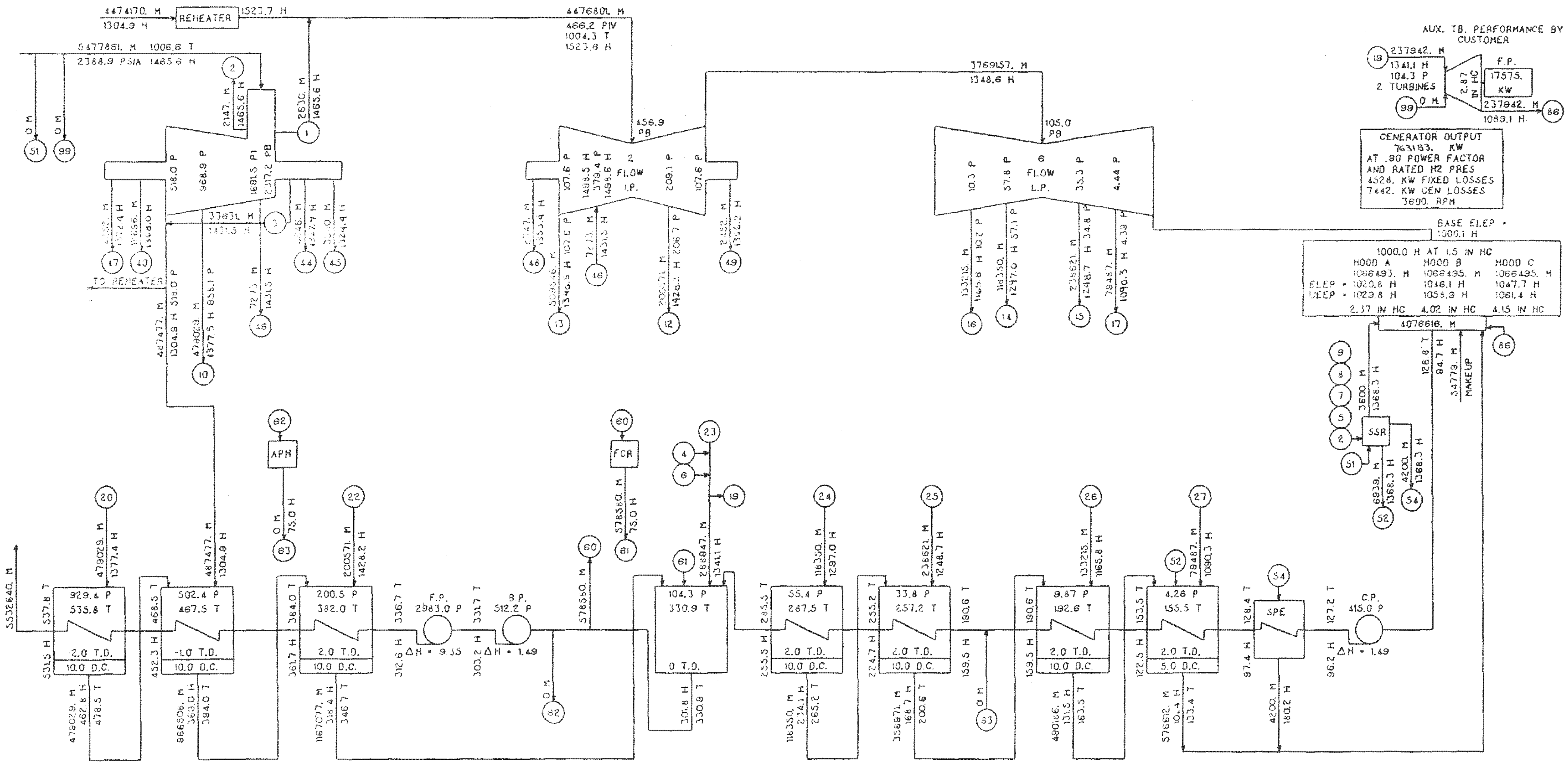
IP14_004982

FIG. 9F

TURBINE AND EXTRACTION ARRANGEMENT IS SCHEMATIC ONLY

CONTRACT CYCLE HEAT BALANCE TEST No.7

THE VALUE OF GENERATOR OUTPUT SHOWN ON THIS HEAT BALANCE IS AFTER ALL POWER FOR EXCITATION AND OTHER TURBINE-GENERATOR AUXILIARIES HAS BEEN DEDUCTED.



VALVE BEST POINT NET HEAT RATE $= \dfrac{4076616.\,(1.49) + 5477.9\,(719.0 - 531.5) + 5477861\,(1465.6 - 531.5) + 4474170.\,(1523.7 - 1304.9)}{763183.} = 7996.9\ \dfrac{\text{BTU}}{\text{KW-HR}}$

LEGEND - CALCULATIONS BASED ON 1967 ASME STEAM TABLES
M - FLOW-LB/HR
P - PRESSURE-PSIA
H - ENTHALPY-BTU/LB
T - TEMPERATURE-F DEGREES

9619T 1 0 1

KW / / IN HC ABS.
CONTRACT CYCLE HEAT BALANCE TEST NO.7
TC6F 30.0 IN. LSB 3600 RPM
2400.0 PSIA 1000. / 1000. T
GEN- 991000. KVA .90 PF LIQ

GENERAL ELECTRIC COMPANY. SCHENECTADY N.Y.

5/14/87
FIG. 9F

IP14_004983

TEST CYCLE HEAT BALANCE

VALVE POINT 3RD VL	05/15/87	TEST POINT 07
INTERMOUNTAIN PWR PROJECT		UNIT #2
820000. KW	TC6F-30 IN LSB	TURBINE NO 270T151
2400. PSIG	1000./ 1000. F	2.300 IN HG ABS

CALCULATED USING ASME STEAM TABLES

COMBINED TURBINE-CYCLE PERFORMANCE

	TEST CONDITIONS	* RATED CONDITIONS
TOTAL LOAD	775096.	774305.
HEAT RATE	7864.3	7872.3
THROTTLE FLOW	5477861.	5561237.

TURBINE THERMAL PERFORMANCE

	HIGH PRESS TB		REHEAT TB		
			IP TB		LP TB
	THROTTLE	COLD RHT	INLET	EXH	EXH
PRESS	2388.90	507.00	467.60	106.10	3.513
TEMP	1006.60	607.30	1003.98	621.50	120.69
ENTH	1465.64	1303.04	1523.41	1339.91	1038.31
ENTR	1.5369		1.7465	1.7619	
EFF	86.221		91.796		93.757

ABSCISSA PHPX/PT=0.2122 P1STSTG/PT=0.7074 VAN= 501.5

THRU FLOW PERFORMANCE OF CONDENSING SECTION SHAFT NO 1

	TOTAL TB ENERGY BALANCE		LP TB ENERGY BALANCE	
	RHT TB	LP TB	RHT TB	LP TB
AE	517.40	324.96		
H ELEP	1038.31		1038.31	
H UEEP	1047.45		1047.45	
EFF ELEP	93.76	92.81	93.76	92.81
EFF UEEP	91.99	90.00	91.99	90.00
VAN	501.48		501.48	

* LOAD AND HEAT RATE AT RATED POWER FACTOR AND H2 PRESS. FLOW AT RATED THROTTLE PRESS. OF 2412.2 PSIA AND TEMP. OF 1000 F.

A07-1

T G L PERFORMANCE OF CONDENSING SECTION . SHAFT NO 1

	TOTAL TB ENERGY BALANCE		LP TB ENERGY BALANCE	
	RHT TB	LP TB	RHT TB	LP TB
H ELEP	1040.77		1040.77	
H UEEP	1049.89		1049.89	
EFF ELEP	93.28	92.05	93.28	92.05
EFF UEEP	91.52	89.25	91.52	89.25
VAN	502.78		502.78	

STAGE FLOW FUNCTION

STG NO	SHELL PRESS	ONE VEL HD	PCT DELTA P	FLANGE PRESS	NOZ AREA	Q/AP H FLG	QFS	Q/AP H SHL
1	1689.80	0.	0.	0.	86.6	0.	5432148.	1006.2
4	962.48	3.391	1.11	951.80	157.4	847.5	4926550.	842.8
RH 1	467.60	0.	0.	0.	350.2	0.	4483722.	800.0
8	458.25	0.	0.	0.	350.2	0.	4490995.	817.6
11	208.21	0.722	1.11	205.90	711.2	791.9	4284397.	781.9
15	106.10	0.	0.	0.	807.6	0.	3841718.	1129.2
15	58.58	0.239	1.18	57.89	1414.8	1090.5	3721658.	1064.9
16	35.72	0.160	1.30	35.26	2021.4	1106.9	3477102.	1083.4
18	10.46	0.049	1.36	10.32	6018.0	1092.0	3353727.	1047.6
19	4.51	0.015	0.95	4.46	12096.0	1125.1	3256836.	1119.8

TL	PRESS	TEMP	ENTH	FLOW		

F E E D W A T E R   C Y C L E

TL	PRESS	TEMP	ENTH	FLOW		
					HEATER	8
4 FW IN	2669.20	467.90	451.40	5483310.6	CLOSED	
2 EXTR	943.10	772.80	1375.97	488974.9	TD =	-1.6
3 DRAIN	943.10	473.80	457.37	488974.9	DC =	5.9
					HEATER	7
7 FW IN	2669.20	385.90	363.19	5483310.6	CLOSED	
5 EXTR	495.90	606.20	1303.29	471082.7	TD =	-1.7
6 DRAIN	495.90	393.70	368.61	960057.6	DC =	7.8
3 ENTRY	943.10	473.80	457.37	488974.9		
					HEATER	6
10 FW IN	2754.40	336.30	311.83	5483310.6	CLOSED	
8 EXTR	204.40	802.90	1426.81	206598.3	TD =	-2.3
9 DRAIN	204.40	343.10	314.64	1166655.9	DC =	6.8
6 ENTRY	495.90	393.70	368.61	960057.6		
					PUMP	
11 FW IN	0.	0.	0.	5430703.8		
86 SEAL INJ	0.	0.	0.	117579.8		
30 SEAL RET	0.	0.	0.	64973.0		
32 LEAKAGE	0.	0.	0.	0.		
24 EXTR	1500.00	263.68	235.47	0.		
35 FW OUT	2754.40	336.30	311.83	5483310.6		
					HEATER	5
13 FW IN	114.80	289.30	258.82	4016291.1	OPEN	
12 EXTR	105.80	621.30	1339.83	248542.4	STO =	514.9
111 DRAIN	105.80	332.00	302.89	6403041.8	SC =	-0.1
109 ENTRY	0.	0.	265.32	2138993.9		
					HEATER	4
17 FW IN	160.10	258.20	227.18	4016291.8	CLOSED	
15 EXTR	56.85	518.00	1292.30	120060.2	TD =	-0.1
16 DRAIN	56.85	262.30	231.14	120060.2	DC =	4.1
					HEATER	3
20 FW IN	160.10	191.30	159.69	4016291.8	CLOSED	
18 EXTR	34.09	416.70	1245.33	244555.9	TD =	-0.5
19 DRAIN	34.09	199.80	167.94	364616.1	DC =	8.5
16 ENTRY	56.85	262.30	231.14	120060.2		
					HEATER	2
23 FW IN	160.10	156.30	124.63	4016291.8	CLOSED	
21 EXTR	9.93	237.10	1164.14	123375.0	TD =	1.6
22 DRAIN	9.93	163.30	131.27	487991.1	DC =	7.0
19 ENTRY	34.09	199.80	167.94	364616.1		

TL		PRESS	TEMP	ENTH	FLOW		
						STM SEAL REG	
88	FLOW TO	0.	0.	0.	2751.8	CALCULATED	
70	TDV	4.50	653.00	1361.46	2751.8	TO HEATER	
68	TDV	2.08	480.00	1279.07	0.	TO CONDENSER	
	NOT CODED FOR MU		MEAS TOTAL FLOW =		0.		
						HEATER	1
26	FW IN	204.40	127.60	96.07	4016291.8	CLOSED	
25	EXTR	4.40	0.	1090.98	96890.9	TD =	0.6
123	DRAIN	4.40	132.10	100.06	587633.8	DC =	4.5
22	ENTRY	9.93	163.30	131.27	487991.1		
70	ENTRY	4.50	653.00	1361.46	2751.8		
						PUMP	
33	FW IN	0.	0.	0.	4133871.6		
87	LEAKAGE	0.	0.	0.	0.		
27	FW OUT	0.	0.	0.	4133871.6		
						FW TO BOILER	
1	FW IN	2669.20	539.10	533.32	5483310.6	S+L =	-5449.

T U R B I N E   E X P A N S I O N

TL		PRESS	TEMP	ENTH	FLOW		
						MAIN STEAM LINE	
71	EXIT	0.	0.	1465.64	0.		
36	THROTTLE	2388.90	1006.60	1465.64	5477861.3		
						VALVE STEM LKG	
					SQRT	P/V =	85.690
37	LO NO 1	467.80	896.16	1465.64	2622.9	C =	55.757
					SQRT	P/V =	16.701
38	LO NO 2	0.	0.	0.	2154.9	C =	129.028
						EXP TO STG	1
40	SHELL	1689.80	913.65	1430.35	5432148.4		
112	EXTR	0.	0.	1430.35	40935.1		
						PACKING NO	2
					SQRT	P/V =	.115E 19
42	LO NO 1	110.28	676.00	1367.00	12268.1	C =	0.000
					SQRT	P/V =	4.268
43	LO NO 2	16.83	674.80	1371.38	3751.4	C =	1020.512
					SQRT	P/V =	0.648
100	LO NO 3	0.	0.	0.	603.7	C =	1847.487

TL	PRESS	TEMP	ENTH	FLOW	
					EXP TO STG 4
41 SHELL	962.48	0.	1376.74	4926550.2	
79 EXTR	951.80	774.80	1376.74	488974.9	
					PACKING NO 1
					SQRT P/V = 20.980
46 LO NO 1	109.14	595.80	1326.88	4430.5	C = 382.760
					SQRT P/V = 4.390
47 LO NO 2	16.76	575.70	1323.40	2996.2	C = 820.036
					SQRT P/V = 0.676
100 LO NO 3	0.	0.	0.	603.7	C = 1847.487
					EXPAND TO EXHAUST
49 EXH	507.00	607.30	1303.04	4952182.0	
80 EXTR	507.00	607.30	1303.04	471082.7	
50 TO RHT	507.00	607.30	1303.04	4481099.3	
					REHEATER 1
BEFORE LO	0.08	0.	1523.62	0.	
37 ENTRY					
84 AFTER LO	467.60	1004.30	1523.58	4483722.2	PCTDP = 7.771
					EXPAND TO BOWL
51 ENTRY	458.25	1003.47	1523.41	4490995.1	
125 ENTRY	464.54	804.90	1416.98	7272.9	
					EXP TO STG 11
52 SHELL	208.21	0.	1418.38	4284396.8	
53 EXTR	205.90	804.70	1427.67	206598.3	
					PACKING NO 3
					SQRT P/V = 4.213
57 LO NO 1	16.75	633.50	1351.31	1769.3	C = 1151.765
					SQRT P/V = 0.657
58 LO NO 2	16.75	645.50	1357.13	1875.1	C = 4690.857
					SQRT P/V = 0.654
100 LO NO 3	0.	0.	0.	603.7	C = 1847.487
					SQRT P/V = 0.
100 LO NO 4	0.	0.	0.	603.7	C = 1847.487

TL	PRESS	TEMP	ENTH	FLOW	
					EXPAND TO EXHAUST
56 EXH	106.10	621.50	1339.91	3841718.3	
55 EXTR	108.70	624.80	1341.40	437826.6	
					EXPAND TO BOWL
59 ENTRY	106.10	621.50	1339.91	3841718.3	
					EXP TO STG 15
61 SHELL	58.58	0.	1281.71	3721658.0	
60 EXTR	57.89	530.00	1298.09	120060.2	
					EXP TO STG 16
63 SHELL	35.72	0.	1237.13	3477102.2	
62 EXTR	35.26	425.50	1249.45	244555.9	
					EXP TO STG 18
65 SHELL	10.46	0.	1144.75	3353727.2	
64 EXTR	10.32	242.40	1166.52	123375.0	
					EXP TO STG 19
107 SHELL	4.51	0.	1092.19	3256836.3	
106 EXTR	4.46	0.	1090.98	96890.9	

TL	PRESS	TEMP	ENTH	FLOW	
					CONDENSER
					SHAFT 1
108 TB EXH	1.73	120.69	1047.4478	3256836.3	LEVL = -6234.9
76 ENTRY	0.	0.	0.	870800.2	
122 DRAIN	0.	0.	0.	4133871.4	
					GENERATOR 1
					SHAFT 1

MEASURED LOAD = 775096.0 PF = 1.000 H2 = 62.00
SHAFT 1 KW = 786079.0 FL =4353.0 GL = 6630.0

TEST CYCLE HEAT BALANCE

P E R F O R M A N C E

TRUNKLINE OUTPUT

TL	P	T	H	Q	SV	SP	PV	TR
1	2669.2	539.1	533.3	5483311.	0.0209	0.	0.	-5449.3
2	943.1	772.8	1376.0	488975.	0.7113	537.521	-1.579	235.3
3	943.1	473.8	457.4	488975.	0.0198	0.	5.900	0.
4	2669.2	467.9	451.4	5483311.	0.	0.	0.	0.
5	495.9	606.2	1303.3	471083.	1.1784	466.161	-1.739	140.0
6	495.9	393.7	368.6	960058.	0.0185	0.	7.800	0.
7	2669.2	385.9	363.2	5483311.	0.	0.	0.	0.
8	204.4	802.9	1426.8	206598.	3.6195	383.632	-2.268	419.3
9	204.4	343.1	314.6	1166656.	0.0179	0.	6.800	0.
10	2754.4	336.3	311.8	5483311.	0.0176	0.	0.	0.
11	0.	0.	0.	5430704.	0.	0.	0.	0.
12	105.8	621.3	1339.8	248542.	5.9950	331.926	514.900	289.4
13	114.8	289.3	258.8	4016291.	0.0173	0.	0.	0.
14	160.1	289.3	258.9	4016292.	0.0173	1.014	0.	160.1
15	56.8	518.0	1292.3	120060.	10.1238	289.208	-0.092	228.8
16	56.8	262.3	231.1	120060.	0.0171	0.	4.100	0.
17	160.1	258.2	227.2	4016292.	0.	0.	0.	0.
18	34.1	416.7	1245.3	244556.	15.1464	257.738	-0.462	159.0
19	34.1	199.8	167.9	364616.	0.0166	0.	8.500	0.
20	160.1	191.3	159.7	4016292.	0.	0.	0.	0.
21	9.9	237.1	1164.1	123375.	41.4392	192.869	1.569	44.2
22	9.9	163.3	131.3	487991.	0.0164	0.	7.000	0.
23	160.1	156.3	124.6	4016292.	0.	0.	0.	0.
24	1500.0	263.7	235.5	0.	0.0170	0.	0.	0.
25	4.4	0.	1091.0	96891.	0.	156.876	0.576	-156.9
26	204.4	127.6	96.1	4016292.	0.0162	0.	0.	0.
27	0.	0.	0.	4133872.	0.	0.	0.	0.
28	0.	0.	0.	19570.	0.	0.	0.	0.
29	0.	0.	0.	45403.	0.	0.	0.	0.
30	0.	0.	0.	64973.	0.	0.	0.	0.
31	2759.6	304.0	278.8	0.	0.0173	0.	0.	0.
33	0.	0.	0.	4133872.	0.	0.	0.	0.
34	0.	0.	0.	-5449.	0.	0.	0.	0.
35	2754.4	336.3	311.8	5483311.	0.0176	0.	0.	0.
36	2388.9	1006.6	1465.6	5477861.	0.3253	1465.639	85.690	0.
37	467.8	896.2	1465.6	2623.	1.6771	0.780	16.701	55.8
38	0.	0.	0.	2155.	0.	0.	0.	129.0
39	2388.9	0.	1465.6	5473083.	0.3253	0.	85.690	0.
40	1689.8	913.6	1430.3	5432148.	0.4348	143.743	62.337	0.
41	962.5	0.	1376.7	4926550.	0.6978	540.499	37.138	842.8
42	110.3	676.0	1367.0	12268.	6.0554	0.779	4.268	0.0
43	16.8	674.8	1371.4	3751.	40.0738	0.	0.648	1020.5
45	0.	0.	0.	33662.	0.	0.	0.	0.
46	109.1	595.8	1326.9	4430.	5.6634	0.703	4.390	382.8
47	16.8	575.7	1323.4	2996.	36.6972	0.	0.676	820.0
48	0.	0.	0.	4960212.	0.	0.	0.	0.
49	507.0	607.3	1303.0	4952182.	1.1518	468.444	20.980	0.
50	507.0	607.3	1303.0	4481099.	0.	0.	0.	0.
51	458.2	1003.5	1523.4	4490995.	1.8629	0.	15.686	0.

TL	P	T	H	Q	SV	SP	PV	TR
52	208.2	0.	1418.4	4284397.	3.5076	385.589	7.705	781.9
53	205.9	804.7	1427.7	206598.	3.5982	384.249	7.565	0.
54	106.1	621.5	1339.9	4279545.	5.9789	0.	4.213	0.
55	108.7	624.8	1341.4	437827.	5.8526	333.911	0.	0.
56	106.1	621.5	1339.9	3841718.	5.9789	332.133	0.	0.
57	16.8	633.5	1351.3	1769.	38.7886	0.	0.657	1151.8
58	16.8	645.5	1357.1	1875.	39.2178	0.	0.654	4690.9
59	106.1	621.5	1339.9	3841718.	5.9790	0.	4.213	0.
60	57.9	530.0	1298.1	120060.	10.0674	290.382	2.398	0.
61	58.6	0.	1281.7	3721658.	9.6006	291.316	2.470	1064.9
62	35.3	425.5	1249.4	244556.	14.7921	259.722	1.544	0.
63	35.7	0.	1237.1	3477102.	14.1723	260.771	1.588	1083.4
64	10.3	242.4	1166.5	123375.	40.1673	194.702	0.507	0.
65	10.5	0.	1144.8	3353727.	36.9690	195.817	0.532	1047.6
66	16.5	626.5	1347.9	9795.	39.2425	0.	0.	0.
67	105.8	334.7	1189.8	0.	4.2198	0.	0.	0.
68	2.1	480.0	1279.1	0.	268.7139	0.	0.	0.
69	4.5	653.0	1361.5	631.	147.1380	0.	0.	0.
70	4.5	653.0	1361.5	2752.	147.1380	0.	0.	0.
71	0.	0.	1465.6	0.	0.	0.	0.	0.
72	0.	0.	0.	515.	0.	0.	0.	0.
73	0.	0.	0.	-6235.	0.	0.	0.	0.
75	0.	0.	0.	6173.	0.	0.	0.	0.
76	0.	0.	0.	870800.	0.	0.	0.	0.
79	951.8	774.8	1376.7	488975.	0.7057	538.621	36.724	0.
80	507.0	607.3	1303.0	471083.	0.	0.	0.	0.
81	16.5	626.5	1347.9	0.	39.2425	0.	0.	0.
82	0.	0.	0.	4481099.	0.	0.	0.	0.
83	105.8	331.9	1188.2	271.	0.	0.	0.	0.
84	467.6	1004.3	1523.6	4483722.	1.8255	7.771	16.005	800.0
86	0.	0.	0.	117580.	0.	0.	0.	0.
88	0.	0.	0.	2752.	0.	0.	0.	0.
90	135.8	332.0	303.0	0.	0.0178	0.	0.	0.
91	130.8	237.5	206.1	972338.	0.0169	0.647	0.	130.8
95	1.7	120.7	1038.3	3256836.	184.9225	1047.448	3.513	501.5
99	0.	0.	0.	6641.	0.	0.	0.	0.
100	0.	0.	0.	604.	0.	0.	0.	1847.5
104	2669.2	539.1	533.3	5491047.	0.0209	1.028	0.	2669.2
106	4.5	0.	1091.0	96891.	78.6673	157.485	0.238	0.
107	4.5	0.	1092.2	3256836.	77.9511	0.	0.240	1119.8
108	1.7	120.7	1047.4	3256836.	199.6378	1047.448	3.513	-6234.9
109	0.	0.	265.3	2138994.	0.	0.	0.	0.
111	105.8	332.0	302.9	6403042.	4.2011	0.	-0.074	0.
112	0.	0.	1430.3	40935.	0.	0.	0.	0.
113	0.	0.	0.	5415525.	0.	0.	0.115E 19	0.
114	438.5	126.4	95.5	14848.	0.0162	0.624	0.	438.5
115	438.5	126.4	95.5	14282.	0.0162	0.624	0.	438.5
116	438.5	126.4	95.5	27472.	0.0162	0.623	0.	438.5
117	438.5	126.4	95.5	15749.	0.0162	0.660	0.	438.5
118	438.5	126.4	95.5	22286.	0.0162	0.660	0.	438.5
119	438.5	126.4	95.5	22944.	0.0162	0.660	0.	438.5
120	0.	0.	0.	4778.	0.	0.	0.	0.
122	0.	0.	0.	4133871.	0.	0.	0.	0.
123	4.4	132.1	100.1	587634.	0.0163	0.	4.500	0.
125	464.5	804.9	1417.0	7273.	1.5616	0.628	0.	462.0
130	0.	0.	0.	205983.	0.	0.	0.	0.
131	106.9	621.2	1339.7	101833.	5.9318	1.018	0.	106.9
132	107.1	620.9	1339.5	104150.	5.9188	1.019	0.	107.1
133	0.	0.	0.	205379.	0.	0.	0.	0.
201	0.1	0.	1523.6	0.	0.	220.576	0.	0.

NO test point

Heat Balances

TEST CYCLE HEAT

VALVE POINT VWO-OP 05/15/8
INTERMOUNTAIN PWR PROJECT
820000. KW TC6F-30 T151
2400. PSIG 1000./ 100C 3

VWO-5%OP

CALCULATED USING ASME STEAM TABLES

TR8

COMBINED TURBINE-CYCLE PERFORMANCE

	TEST CONDITIONS	* RATED CONDITIONS
TOTAL LOAD	898356.	898356.
HEAT RATE	7772.3	7772.3
THROTTLE FLOW	6496919.	6281950.

TURBINE THERMAL PERFORMANCE

	HIGH PRESS TB		REHEAT TB IP TB		LP TB
	THROTTLE	COLD RHT	INLET	EXH	EXH
PRESS	2477.14	590.03	544.47	122.65	3.195
TEMP	988.20	612.10	995.81	612.80	117.29
ENTH	1450.32	1299.07	1516.74	1334.47	1020.74
ENTR	1.5228		1.7255	1.7411	
EFF	87.790		91.714		93.902

ABSCISSA PHPX/PT=0.2382 P1STSTG/PT=0.8045 VAN= 616.5

THRU FLOW PERFORMANCE OF CONDENSING SECTION SHAFT NO 1

	TOTAL TB ENERGY BALANCE RHT TB	LP TB	LP TB ENERGY BALANCE RHT TB	LP TB
AE	528.21	336.94		
H ELEP	1020.74		1020.74	
H UEEP	1028.10		1028.10	
EFF ELEP	93.90	93.11	93.90	93.11
EFF UEEP	92.51	90.93	92.51	90.93
VAN	616.52		616.52	

* LOAD AND HEAT RATE AT RATED POWER FACTOR AND H2 PRESS. FLOW AT RATED THROTTLE PRESS. OF 2412.2 PSIA AND TEMP. OF 1000 F.

A08-1

TEST CYCLE HEAT BALANCE

VALVE POINT VWO-OP	05/15/87	TEST POINT 08
INTERMOUNTAIN PWR PROJECT		UNIT #2
820000. KW	TC6F-30 IN LSB	TURBINE NO 270T151
2400. PSIG	1000./ 1000. F	2.300 IN HG ABS

CALCULATED USING ASME STEAM TABLES

COMBINED TURBINE-CYCLE PERFORMANCE

	TEST CONDITIONS	* RATED CONDITIONS
TOTAL LOAD	898356.	898356.
HEAT RATE	7772.3	7772.3
THROTTLE FLOW	6496919.	6281950.

TURBINE THERMAL PERFORMANCE

	HIGH PRESS TB		REHEAT TB IP TB		LP TB
	THROTTLE	COLD RHT	INLET	EXH	EXH
PRESS	2477.14	590.03	544.47	122.65	3.195
TEMP	988.20	612.10	995.81	612.80	117.29
ENTH	1450.32	1299.07	1516.74	1334.47	1020.74
ENTR	1.5228		1.7255	1.7411	
EFF	87.790		91.714		93.902

ABSCISSA PHPX/PT=0.2382 P1STSTG/PT=0.8045 VAN= 616.5

THRU FLOW PERFORMANCE OF CONDENSING SECTION SHAFT NO 1

	TOTAL TB ENERGY BALANCE		LP TB ENERGY BALANCE	
	RHT TB	LP TB	RHT TB	LP TB
AE	528.21	336.94		
H ELEP	1020.74		1020.74	
H UEEP	1028.10		1028.10	
EFF ELEP	93.90	93.11	93.90	93.11
EFF UEEP	92.51	90.93	92.51	90.93
VAN	616.52		616.52	

* LOAD AND HEAT RATE AT RATED POWER FACTOR AND H2 PRESS. FLOW AT RATED THROTTLE PRESS. OF 2412.2 PSIA AND TEMP. OF 1000 F.

A08-1

T G L PERFORMANCE OF CONDENSING SECTION SHAFT NO 1

	TOTAL TB ENERGY BALANCE		LP TB ENERGY BALANCE	
	RHT TB	LP TB	RHT TB	LP TB
H ELEP	1023.00		1023.00	
H UEEP	1030.39		1030.39	
EFF ELEP	93.48	92.44	93.48	92.44
EFF UEEP	92.07	90.25	92.07	90.25
VAN	618.01		618.01	

STAGE FLOW FUNCTION

STG NO	SHELL PRESS	ONE VEL HD	PCT DELTA P	FLANGE PRESS	NOZ AREA	Q/AP H FLG	QFS	Q/AP H SHL
1	1992.87	0.	0.	0.	86.6	0.	6438694.	1007.5
4	1124.35	4.554	1.28	1110.00	157.4	850.9	5801024.	845.5
RH 1	544.47	0.	0.	0.	350.2	0.	5249181.	800.5
8	533.58	0.	0.	0.	350.2	0.	5262602.	818.8
11	242.73	0.849	1.12	240.01	711.2	792.4	5019764.	782.2
15	122.65	0.	0.	0.	807.6	0.	4463988.	1128.8
15	67.63	0.311	1.33	66.73	1414.8	1089.7	4315958.	1063.6
16	41.18	0.202	1.42	40.59	2021.4	1104.1	4019545.	1080.1
18	12.09	0.064	1.53	11.91	6018.0	1071.1	3865914.	1044.7
19	5.14	0.028	1.57	5.06	12096.0	1132.1	3724659.	1123.2

TL	PRESS	TEMP	ENTH	FLOW		

F E E D W A T E R   C Y C L E

TL	PRESS	TEMP	ENTH	FLOW		
					HEATER	8
4 FW IN	2830.00	481.70	466.84	6502076.0	CLOSED	
2 EXTR	1098.85	779.40	1371.87	614860.0	TD =	1.8
3 DRAIN	1098.85	489.30	475.24	614860.0	DC =	7.6
					HEATER	7
7 FW IN	2830.00	397.50	375.61	6502076.0	CLOSED	
5 EXTR	577.10	610.90	1299.40	585006.7	TD =	0.3
6 DRAIN	577.10	406.70	382.70	1199866.7	DC =	9.2
3 ENTRY	1098.85	489.30	475.24	614860.0		
					HEATER	6
10 FW IN	3013.10	348.50	324.83	6502076.0	CLOSED	
8 EXTR	238.20	796.30	1421.99	242838.4	TD =	-0.8
9 DRAIN	238.20	356.50	328.75	1442705.1	DC =	8.0
6 ENTRY	577.10	406.70	382.70	1199866.7		
					PUMP	
11 FW IN	0.	0.	0.	6460944.9		
86 SEAL INJ	0.	0.	0.	106069.8		
30 SEAL RET	0.	0.	0.	64938.7		
32 LEAKAGE	0.	0.	0.	0.		
24 EXTR	1500.00	294.46	266.73	0.		
35 FW OUT	3013.10	348.50	324.83	6502076.0		
					HEATER	5
13 FW IN	131.80	298.00	267.78	4725859.4	OPEN	
12 EXTR	122.35	613.70	1334.95	291668.6	STO =	-1024.8
111 DRAIN	122.35	342.70	314.09	7355973.9	SC =	0.0
109 ENTRY	0.	0.	280.50	2337734.2		
					HEATER	4
17 FW IN	167.90	265.90	235.03	4725859.8	CLOSED	
15 EXTR	65.46	510.30	1287.74	148029.7	TD =	0.4
16 DRAIN	65.46	271.00	240.02	148029.7	DC =	5.1
					HEATER	3
20 FW IN	167.90	197.70	166.13	4725859.8	CLOSED	
18 EXTR	39.21	409.70	1241.24	296412.4	TD =	0.1
19 DRAIN	39.21	207.00	175.19	444442.1	DC =	9.3
16 ENTRY	65.46	271.00	240.02	148029.7		
					HEATER	2
23 FW IN	167.90	160.90	129.25	4725859.8	CLOSED	
21 EXTR	11.40	228.90	1159.77	153631.6	TD =	1.8
22 DRAIN	11.40	168.70	136.68	598073.7	DC =	7.8
19 ENTRY	39.21	207.00	175.19	444442.1		

TL		PRESS	TEMP	ENTH	FLOW		
						STM SEAL REG	
88	FLOW TO	0.	0.	0.	8020.4	CALCULATED	
70	TDV	5.14	644.60	1357.36	8020.4	TO HEATER	
68	TDV	1.88	480.00	1279.08	0.	TO CONDENSER	
	NOT CODED FOR MU		MEAS TOTAL FLOW =		0.		
						HEATER	1
26	FW IN	228.40	124.20	92.74	4725859.8	CLOSED	
25	EXTR	4.91	0.	1086.23	141255.1	TD =	0.6
123	DRAIN	4.91	130.40	98.36	747349.1	DC =	6.2
22	ENTRY	11.40	168.70	136.68	598073.7		
70	ENTRY	5.14	644.60	1357.36	8020.4		
						PUMP	
33	FW IN	0.	0.	0.	4831929.6		
87	LEAKAGE	0.	0.	0.	0.		
27	FW OUT	0.	0.	0.	4831929.6		
						FW TO BOILER	
1	FW IN	2830.00	554.30	551.63	6502076.0	S+L =	-5157.

T U R B I N E   E X P A N S I O N

TL		PRESS	TEMP	ENTH	FLOW		
						MAIN STEAM LINE	
71	EXIT	0.	0.	1450.32	0.		
36	THROTTLE	2477.14	988.20	1450.32	6496919.1		
						VALVE STEM LKG	
						SQRT P/V =	89.971
37	LO NO 1	544.67	872.85	1450.31	2863.5	C =	55.065
						SQRT P/V =	19.687
38	LO NO 2	0.	0.	0.	2090.7	C =	106.199
						EXP TO STG	1
40	SHELL	1992.87	926.23	1426.61	6438693.9		
112	EXTR	0.	0.	1426.61	53270.9		
						PACKING NO	2
						SQRT P/V =	.115E 19
42	LO NO 1	127.70	677.50	1366.82	14646.0	C =	0.000
						SQRT P/V =	4.943
43	LO NO 2	17.18	668.60	1368.34	7530.7	C =	1651.600
						SQRT P/V =	0.663
100	LO NO 3	0.	0.	0.	633.6	C =	1907.083

TL	PRESS	TEMP	ENTH	FLOW	
				EXP TO STG	4
41 SHELL	1124.35	0.	1372.55	5801023.6	
79 EXTR	1110.00	781.40	1372.55	614860.0	
				PACKING NO	1
				SQRT P/V =	24.537
46 LO NO 1	126.30	592.10	1323.82	5338.4 C =	389.192
				SQRT P/V =	5.097
47 LO NO 2	17.02	571.70	1321.46	3577.5 C =	826.231
				SQRT P/V =	0.688
100 LO NO 3	0.	0.	0.	633.6 C =	1907.083
				EXPAND TO EXHAUST	
49 EXH	590.03	612.10	1299.07	5831324.1	
80 EXTR	590.03	612.10	1299.07	585006.7	
50 TO RHT	590.03	612.10	1299.07	5246317.4	
				REHEATER	1
BEFORE LO	0.08	0.	1517.05	0.	
37 ENTRY					
84 AFTER LO	544.47	996.30	1517.01	5249180.9	PCTDP = 7.722
				EXPAND TO BOWL	
51 ENTRY	533.58	995.21	1516.74	5262601.9	
125 ENTRY	545.13	802.90	1412.61	13420.9	
				EXP TO STG	11
52 SHELL	242.73	0.	1412.55	5019763.5	
53 EXTR	240.01	797.50	1422.54	242838.4	
				PACKING NO	3
				SQRT P/V =	4.897
57 LO NO 1	17.00	632.10	1350.61	2280.0 C =	1165.281
				SQRT P/V =	0.667
58 LO NO 2	17.00	641.50	1355.17	2158.7 C =	5133.372
				SQRT P/V =	0.665
100 LO NO 3	0.	0.	0.	633.6 C =	1907.083
				SQRT P/V =	0.
100 LO NO 4	0.	0.	0.	633.6 C =	1907.083

TL	PRESS	TEMP	ENTH	FLOW	
					EXPAND TO EXHAUST
56 EXH	122.65	612.80	1334.47	4463987.5	
55 EXTR	125.75	616.40	1336.09	550070.1	
					EXPAND TO BOWL
59 ENTRY	122.65	612.80	1334.47	4463987.5	
					EXP TO STG 15
61 SHELL	67.63	0.	1275.97	4315957.8	
60 EXTR	66.73	520.50	1292.66	148029.7	
					EXP TO STG 16
63 SHELL	41.18	0.	1231.68	4019545.4	
62 EXTR	40.59	416.80	1244.52	296412.4	
					EXP TO STG 18
65 SHELL	12.09	0.	1140.38	3865913.8	
64 EXTR	11.91	220.70	1155.69	153631.6	
					EXP TO STG 19
107 SHELL	5.14	0.	1086.76	3724658.8	
106 EXTR	5.06	0.	1086.23	141255.1	

TL	PRESS	TEMP	ENTH	FLOW	
					CONDENSER
					SHAFT 1
108 TB EXH	1.57	117.29	1028.1024	3724658.8	LEVL = -4445.2
76 ENTRY	0.	0.	0.	1102826.2	
122 DRAIN	0.	0.	0.	4831930.2	
					GENERATOR 1
					SHAFT 1

MEASURED LOAD = 898356.0　　PF = 1.000　　H2 = 63.00
SHAFT 1 KW = 910504.5　　FL =4353.0　　GL = 7795.5

TEST CYCLE HEAT BALANCE

P E R F O R M A N C E

TRUNKLINE OUTPUT

TL	P	T	H	Q	SV	SP	PV	TR
1	2830.0	554.3	551.6	6502076.	0.0213	0.	0.	-5156.9
2	1098.9	779.4	1371.9	614860.	0.6049	556.147	1.847	223.3
3	1098.9	489.3	475.2	614860.	0.0201	0.	7.600	0.
4	2830.0	481.7	466.8	6502076.	0.	0.	0.	0.
5	577.1	610.9	1299.4	585007.	1.0029	482.036	0.336	128.9
6	577.1	406.7	382.7	1199867.	0.0187	0.	9.200	0.
7	2830.0	397.5	375.6	6502076.	0.	0.	0.	0.
8	238.2	796.3	1422.0	242838.	3.0800	396.736	-0.764	399.6
9	238.2	356.5	328.7	1442705.	0.0181	0.	8.000	0.
10	3013.1	348.5	324.8	6502076.	0.0177	0.	0.	0.
11	0.	0.	0.	6460945.	0.	0.	0.	0.
12	122.4	613.7	1334.9	291669.	5.1327	342.726	-1024.800	271.0
13	131.8	298.0	267.8	4725859.	0.0174	0.	0.	0.
14	167.9	298.0	267.8	4725860.	0.0174	1.014	0.	167.9
15	65.5	510.3	1287.7	148030.	8.7032	298.447	0.447	211.9
16	65.5	271.0	240.0	148030.	0.0172	0.	5.100	0.
17	167.9	265.9	235.0	4725860.	0.	0.	0.	0.
18	39.2	409.7	1241.2	296412.	13.0355	266.047	0.147	143.7
19	39.2	207.0	175.2	444442.	0.0167	0.	9.300	0.
20	167.9	197.7	166.1	4725860.	0.	0.	0.	0.
21	11.4	228.9	1159.8	153632.	35.5947	199.469	1.769	29.4
22	11.4	168.7	136.7	598074.	0.0164	0.	7.800	0.
23	167.9	160.9	129.3	4725860.	0.	0.	0.	0.
24	1500.0	294.5	266.7	0.	0.0173	0.	0.	0.
25	4.9	0.	1086.2	141255.	0.	161.469	0.569	-161.5
26	228.4	124.2	92.7	4725860.	0.0162	0.	0.	0.
27	0.	0.	0.	4831930.	0.	0.	0.	0.
28	0.	0.	0.	19289.	0.	0.	0.	0.
29	0.	0.	0.	45650.	0.	0.	0.	0.
30	0.	0.	0.	64939.	0.	0.	0.	0.
31	3027.8	299.1	274.4	0.	0.0172	0.	0.	0.
33	0.	0.	0.	4831930.	0.	0.	0.	0.
34	0.	0.	0.	-5157.	0.	0.	0.	0.
35	3013.1	348.5	324.8	6502076.	0.0177	0.	0.	0.
36	2477.1	988.2	1450.3	6496919.	0.3060	1450.316	89.971	0.
37	544.7	872.9	1450.3	2864.	1.4053	0.780	19.687	55.1
38	0.	0.	0.	2091.	0.	0.	0.	106.2
39	2477.1	0.	1450.3	6491965.	0.3060	0.	89.971	0.
40	1992.9	926.2	1426.6	6438694.	0.3659	143.990	73.796	0.
41	1124.3	0.	1372.5	5801024.	0.5917	559.348	43.590	845.5
42	127.7	677.5	1366.8	14646.	5.2260	0.779	4.943	0.0
43	17.2	668.6	1368.3	7531.	39.0396	0.	0.663	1651.6
45	0.	0.	0.	39850.	0.	0.	0.	0.
46	126.3	592.1	1323.8	5338.	4.8621	0.703	5.097	389.2
47	17.0	571.7	1321.5	3578.	35.9940	0.	0.688	826.2
48	0.	0.	0.	5840874.	0.	0.	0.	0.
49	590.0	612.1	1299.1	5831324.	0.9800	484.404	24.537	0.
50	590.0	612.1	1299.1	5246317.	0.	0.	0.	0.
51	533.6	995.2	1516.7	5262602.	1.5846	0.	18.354	0.

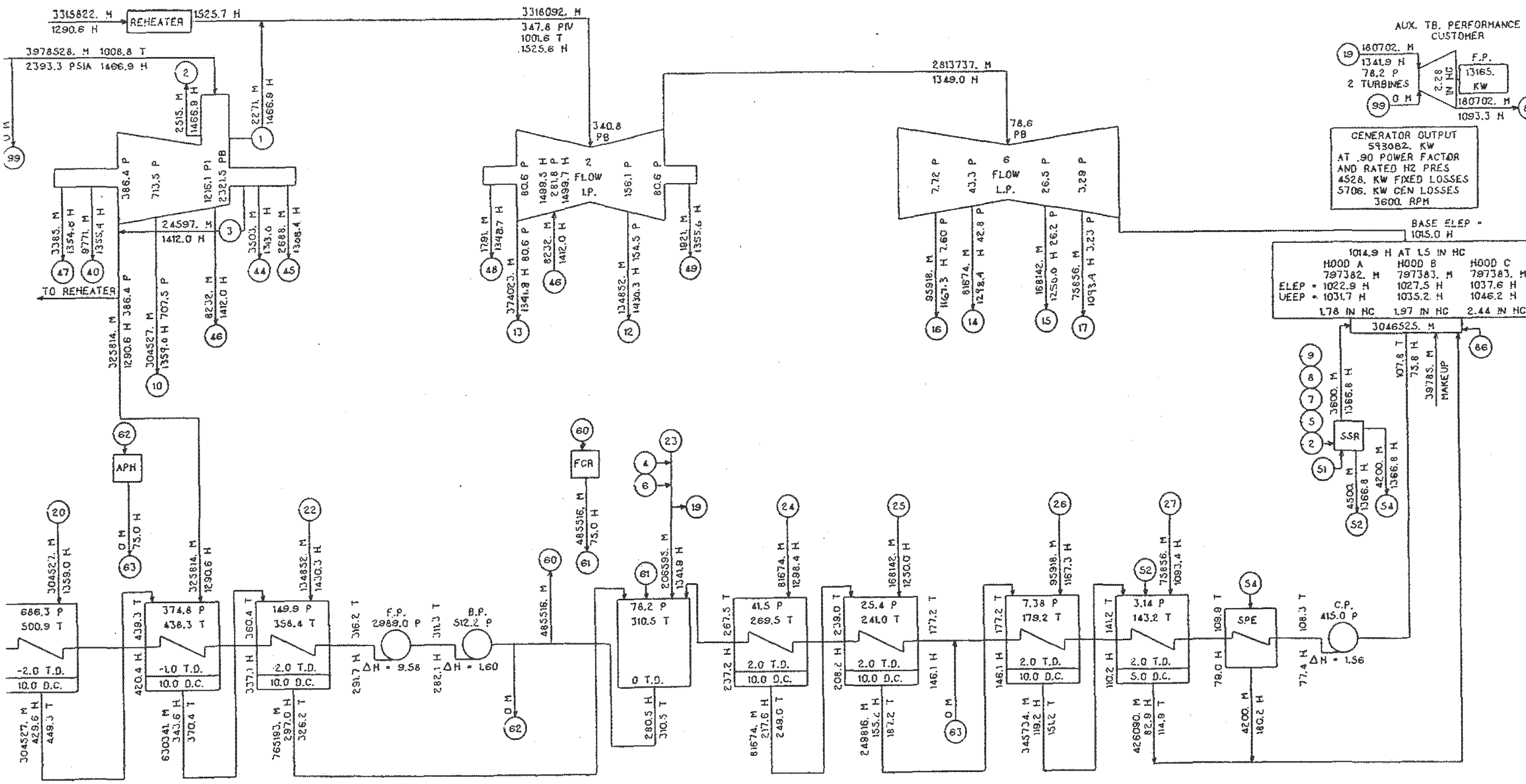
TL	P	T	H	Q	SV	SP	PV	TR
52	242.7	0.	1412.5	5019764.	2.9807	398.783	9.024	782.2
53	240.0	797.5	1422.5	242838.	3.0594	397.396	8.857	0.
54	122.6	612.8	1334.5	5014058.	5.1153	0.	4.897	0.
55	125.8	616.4	1336.1	550070.	5.0048	344.800	0.	0.
56	122.6	612.8	1334.5	4463988.	5.1153	342.911	0.	0.
57	17.0	632.1	1350.6	2280.	38.1675	0.	0.667	1165.3
58	17.0	641.5	1355.2	2159.	38.4989	0.	0.665	5133.4
59	122.6	612.8	1334.5	4463988.	5.1154	0.	4.897	0.
60	66.7	520.5	1292.7	148030.	8.6300	299.726	2.781	0.
61	67.6	0.	1276.0	4315958.	8.2211	300.687	2.868	1063.6
62	40.6	416.8	1244.5	296412.	12.6951	268.135	1.788	0.
63	41.2	0.	1231.7	4019545.	12.1492	269.138	1.841	1080.1
64	11.9	220.7	1155.7	153632.	33.6258	201.590	0.595	0.
65	12.1	0.	1140.4	3865914.	31.9879	202.714	0.615	1044.7
66	16.6	625.7	1347.5	9617.	38.8583	0.	0.	0.
67	109.9	345.6	1195.2	0.	4.1244	0.	0.	0.
68	1.9	480.0	1279.1	0.	297.6007	0.	0.	0.
69	5.1	644.6	1357.4	1863.	127.8890	0.	0.	0.
70	5.1	644.6	1357.4	8020.	127.8890	0.	0.	0.
71	0.	0.	1450.3	0.	0.	0.	0.	0.
72	0.	0.	0.	-1025.	0.	0.	0.	0.
73	0.	0.	0.	-4445.	0.	0.	0.	0.
75	0.	0.	0.	5815.	0.	0.	0.	0.
76	0.	0.	0.	1102826.	0.	0.	0.	0.
79	1110.0	781.4	1372.5	614860.	0.5995	557.401	43.031	0.
80	590.0	612.1	1299.1	585007.	0.	0.	0.	0.
81	12.4	625.7	1347.8	0.	52.0502	0.	0.	0.
82	0.	0.	0.	5246317.	0.	0.	0.	0.
83	122.4	342.7	1190.7	313.	0.	0.	0.	0.
84	544.5	996.3	1517.0	5249181.	1.5528	7.722	18.725	800.5
86	0.	0.	0.	106070.	0.	0.	0.	0.
88	0.	0.	0.	8020.	0.	0.	0.	0.
90	152.3	342.7	314.1	0.	0.0179	0.	0.	0.
91	141.7	234.1	202.7	895029.	0.0169	0.647	0.	141.7
95	1.6	117.3	1020.7	3724659.	198.7881	1028.102	3.195	616.5
99	0.	0.	0.	6971.	0.	0.	0.	0.
100	0.	0.	0.	634.	0.	0.	0.	1907.1
104	2830.0	554.3	551.6	6514032.	0.0213	1.028	0.	2830.0
106	5.1	0.	1086.2	141255.	69.4398	162.741	0.270	0.
107	5.1	0.	1086.8	3724659.	68.3995	0.	0.274	1123.2
108	1.6	117.3	1028.1	3724659.	218.2728	1028.102	3.195	-4445.2
109	0.	0.	280.5	2337734.	0.	0.	0.	0.
111	122.4	342.7	314.1	7355974.	0.0179	0.	0.026	0.
112	0.	0.	1426.6	53271.	0.	0.	0.	0.
113	0.	0.	0.	6415884.	0.	0.	0.115E 19	0.
114	400.4	123.1	92.1	14671.	0.0162	0.624	0.	400.4
115	400.4	123.1	92.1	13570.	0.0162	0.624	0.	400.4
116	400.4	123.1	92.1	27977.	0.0162	0.623	0.	400.4
117	400.4	123.1	92.1	11145.	0.0162	0.660	0.	400.4
118	400.4	123.1	92.1	20090.	0.0162	0.660	0.	400.4
119	400.4	123.1	92.1	18617.	0.0162	0.660	0.	400.4
120	0.	0.	0.	4954.	0.	0.	0.	0.
122	0.	0.	0.	4831930.	0.	0.	0.	0.
123	4.9	130.4	98.4	747349.	0.0162	0.	6.200	0.
125	545.1	802.9	1412.6	13421.	1.3196	0.628	0.	537.8
130	0.	0.	0.	278386.	0.	0.	0.	0.
131	123.2	613.3	1334.7	134133.	5.0959	1.019	0.	123.2
132	123.1	613.1	1334.6	144253.	5.0987	1.020	0.	123.1
133	0.	0.	0.	277752.	0.	0.	0.	0.
201	0.1	0.	1517.0	0.	0.	217.978	0.	0.

C. 9G

CONTRACT CYCLE HEAT BALANCE TEST No. 9

TURBINE AND EXTRACTION ARRANGEMENT IS SCHEMATIC ONLY

THE VALUE OF GENERATOR OUTPUT SHOWN ON THIS HEAT BALANCE IS AFTER ALL POWER FOR EXCITATION AND OTHER TURBINE-GENERATOR AUXILIARIES HAS BEEN DEDUCTED.



$$\frac{3978.5\ (719.5 - 490.8) + 3046525.\ (1.56) + 3978528.\ (1466.9 - 490.8) + 3315822.\ (1525.7 - 1290.6)}{593082.} = 7872.3\ \frac{\text{BTU}}{\text{KW-HR}}$$

POINT
ATE

LEGEND - CALCULATIONS BASED ON 1967 ASME STEAM TABLES
- M - FLOW-LB/HR
- P - PRESSURE-PSIA
- H - ENTHALPY-BTU/LB
- T - TEMPERATURE-F DEGREES

9799T 1 0 1

KW / / IN HG ABS.
CONTRACT CYCLE HEAT BALANCE TEST NO.9
TC6F 30.0 IN. LSB 3600 RPM
2400.0 PSIA 1000. / 1000. T
GEN- 991000. KVA .90 PF LIQ

TP-8 9

5/14/87

FIG. 9G

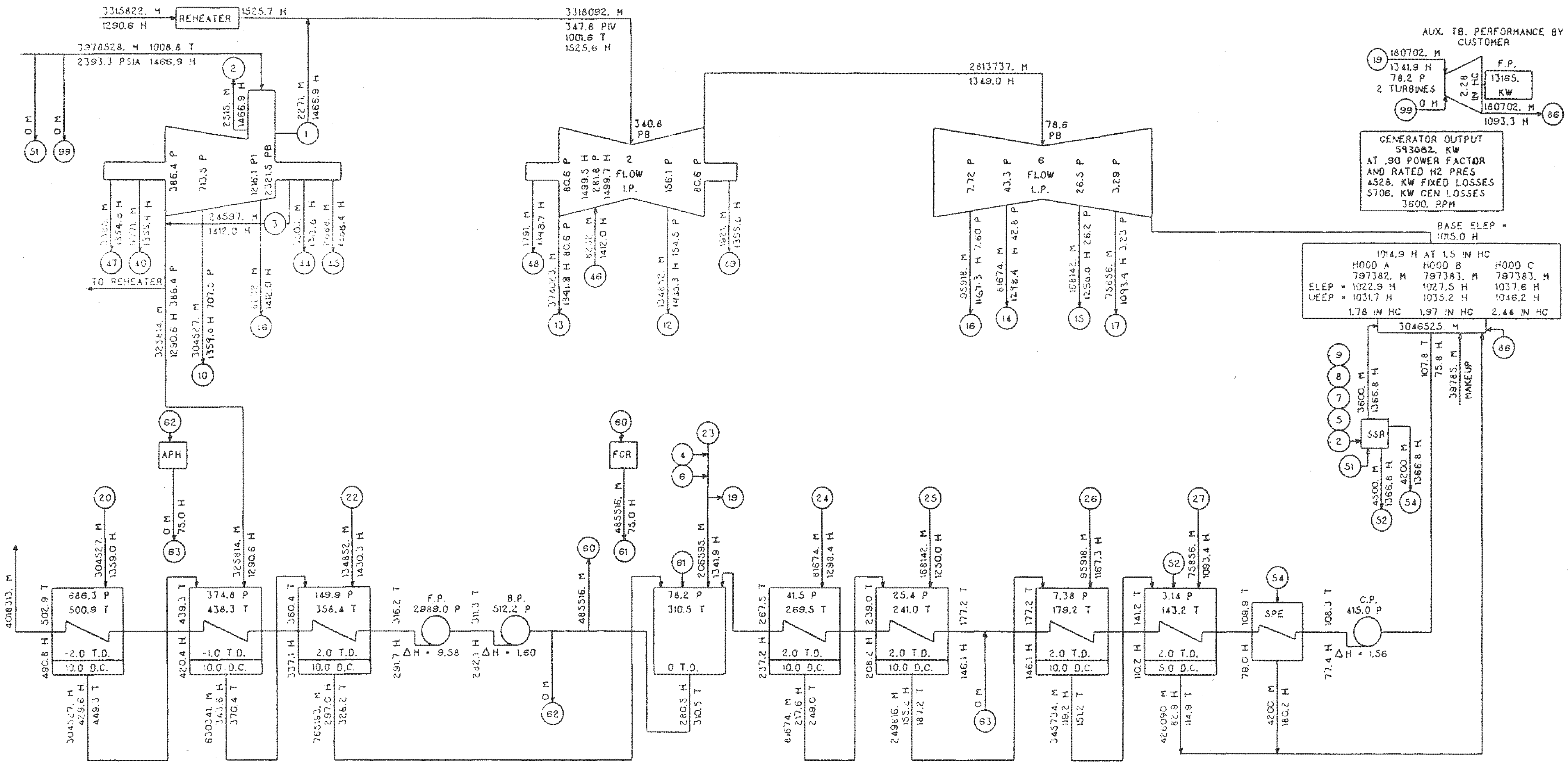
:RAL ELECTRIC COMPANY, SCHENECTADY N.Y.

FIG. 9G

TURBINE AND EXTRACTION ARRANGEMENT IS SCHEMATIC ONLY

CONTRACT CYCLE HEAT BALANCE TEST No. 9

THE VALUE OF GENERATOR OUTPUT SHOWN ON THIS HEAT BALANCE IS AFTER ALL POWER FOR EXCITATION AND OTHER TURBINE-GENERATOR AUXILIARIES HAS BEEN DEDUCTED.



$$
\text{VALUE BEST POINT NET HEAT RATE} = \frac{\begin{array}{l} 3978.5\ (719.5 - 490.8) \\ + 3046525.\ (1.56) \\ + 3978528.\ (1466.9 - 490.8) \\ + 3315822.\ (1525.7 - 1290.6) \end{array}}{593082.} = 7872.3\ \frac{\text{BTU}}{\text{KW-HR}}
$$

LEGEND - CALCULATIONS BASED ON 1967 ASME STEAM TABLES
M - FLOW-LB/HR
P - PRESSURE-PSIA
H - ENTHALPY-BTU/LB
T - TEMPERATURE-F DEGREES

9799T 1 0 1

KW / / IN HG ABS.
CONTRACT CYCLE HEAT BALANCE TEST NO.9
TC6F 30.0 IN. LSB 3600 RPM
2400.0 PSIA 1000. / 1000. T
GEN- 991000. KVA .90 PF LIQ

GENERAL ELECTRIC COMPANY. SCHENECTADY N.Y.

5/14/87

FIG. 9G

IP14_005002

TEST CYCLE HEAT BALANCE

VALVE POINT 2ND VL	05/16/87	TEST POINT 09
INTERMOUNTAIN PWR PROJECT		UNIT #2
820000. KW	TC6F-30 IN LSB	TURBINE NO 270T151
2400. PSIG	1000./ 1000. F	2.300 IN HG ABS

CALCULATED USING ASME STEAM TABLES

COMBINED TURBINE-CYCLE PERFORMANCE

	TEST CONDITIONS	* RATED CONDITIONS
TOTAL LOAD	599736.	599283.
HEAT RATE	7756.9	7762.8
THROTTLE FLOW	3978528.	4035857.

TURBINE THERMAL PERFORMANCE

	HIGH PRESS TB		REHEAT TB IP TB		LP TB
	THROTTLE	COLD RHT	INLET	EXH	EXH
PRESS	2393.30	378.40	348.70	79.47	2.063
TEMP	1008.80	565.50	1000.99	622.10	102.18
ENTH	1466.95	1288.98	1525.28	1341.89	1028.46
ENTR	1.5376		1.7795	1.7951	
EFF	81.581		91.669		93.692

ABSCISSA PHPX/PT=0.1581 P1STSTG/PT=0.5065 VAN= 613.5

THRU FLOW PERFORMANCE OF CONDENSING SECTION SHAFT NO 1

	TOTAL TB ENERGY BALANCE RHT TB	LP TB	LP TB ENERGY BALANCE RHT TB	LP TB
AE	530.27	338.09		
H ELEP	1028.46		1028.46	
H UEEP	1035.99		1035.99	
EFF ELEP	93.69	92.71	93.69	92.71
EFF UEEP	92.27	90.48	92.27	90.48
VAN	613.48		613.48	

* LOAD AND HEAT RATE AT RATED POWER FACTOR AND H2 PRESS. FLOW AT RATED THROTTLE PRESS. OF 2412.2 PSIA AND TEMP. OF 1000 F.

T G L PERFORMANCE OF CONDENSING SECTION SHAFT NO 1

	TOTAL TB ENERGY BALANCE		LP TB ENERGY BALANCE	
	RHT TB	LP TB	RHT TB	LP TB
H ELEP	1030.38		1030.38	
H UEEP	1037.94		1037.94	
EFF ELEP	93.33	92.14	93.33	92.14
EFF UEEP	91.90	89.90	91.90	89.90
VAN	614.71		614.71	

STAGE FLOW FUNCTION

STG NO	SHELL PRESS	ONE VEL HD	PCT DELTA P	FLANGE PRESS	NOZ AREA	Q/AP H FLG	QFS	Q/AP H SHL
1	1212.30	0.	0.	0.	86.6	0.	3940932.	999.9
4	706.41	1.877	0.84	700.50	157.4	831.6	3610828.	828.1
RH 1	348.70	0.	0.	0.	350.2	0.	3319610.	795.6
8	341.73	0.	0.	0.	350.2	0.	3327842.	813.7
11	155.15	0.484	1.00	153.60	711.2	790.4	3182051.	781.6
15	79.47	0.	0.	0.	807.6	0.	2864751.	1126.7
15	43.95	0.152	1.00	43.51	1414.8	1087.8	2781982.	1066.6
16	26.87	0.109	1.18	26.55	2021.4	1105.1	2607188.	1086.5
18	7.83	0.039	1.45	7.71	6018.0	1096.4	2512066.	1054.9
19	3.32	0.019	1.68	3.26	12096.0	1132.4	2417013.	1122.8

TL		PRESS	TEMP	ENTH	FLOW		

F E E D W A T E R   C Y C L E

TL		PRESS	TEMP	ENTH	FLOW		
						HEATER	8
4	FW IN	2569.50	439.90	420.64	3982651.3	CLOSED	
2	EXTR	695.60	718.80	1357.14	317220.6	TD =	-4.1
3	DRAIN	695.60	444.20	423.90	317220.6	DC =	4.3
						HEATER	7
7	FW IN	2569.50	363.90	340.05	3982651.3	CLOSED	
5	EXTR	370.50	564.60	1289.18	311995.5	TD =	-2.7
6	DRAIN	370.50	369.70	342.87	629216.1	DC =	5.8
3	ENTRY	695.60	444.20	423.90	317220.6		
						HEATER	6
10	FW IN	2698.50	315.30	290.23	3982651.3	CLOSED	
8	EXTR	153.20	801.90	1428.42	145791.1	TD =	-3.8
9	DRAIN	153.20	320.50	291.03	775007.2	DC =	5.2
6	ENTRY	370.50	369.70	342.87	629216.1		
						PUMP	
11	FW IN	0.	0.	0.	3953704.5		
86	SEAL INJ	0.	0.	0.	87343.2		
30	SEAL RET	0.	0.	0.	58396.4		
32	LEAKAGE	0.	0.	0.	0.		
24	EXTR	1500.00	223.68	195.18	0.		
35	FW OUT	2698.50	315.30	290.23	3982651.3		
						HEATER	5
13	FW IN	87.85	271.80	240.88	2999607.5	OPEN	
12	EXTR	78.92	619.20	1340.49	179814.5	STO =	522.8
111	DRAIN	78.92	311.50	281.59	5117596.3	SC =	-0.4
109	ENTRY	0.	0.	246.49	1938899.0		
						HEATER	4
17	FW IN	130.60	242.50	211.20	2999607.7	CLOSED	
15	EXTR	42.80	516.00	1292.55	82769.1	TD =	-0.4
16	DRAIN	42.80	245.50	214.06	82769.1	DC =	3.0
						HEATER	3
20	FW IN	130.60	177.50	145.78	2999607.7	CLOSED	
18	EXTR	25.59	416.30	1246.24	174793.3	TD =	-1.1
19	DRAIN	25.59	184.60	152.65	257562.4	DC =	7.1
16	ENTRY	42.80	245.50	214.06	82769.1		
						HEATER	2
23	FW IN	130.60	143.10	111.36	2999607.7	CLOSED	
21	EXTR	7.34	237.20	1165.02	95122.8	TD =	1.4
22	DRAIN	7.34	165.00	132.97	352685.2	DC =	21.9
19	ENTRY	25.59	184.60	152.65	257562.4		

TL		PRESS	TEMP	ENTH	FLOW		
						STM SEAL REG	
88	FLOW TO	0.	0.	0.	1436.1	CALCULATED	
70	TDV	3.23	462.70	1270.82	1436.1	TO HEATER	
68	TDV	1.26	480.00	1279.14	0.	TO CONDENSER	
	NOT CODED FOR MU		MEAS TOTAL FLOW =		0.		
						HEATER	1
26	FW IN	169.20	110.30	78.72	2999607.7	CLOSED	
25	EXTR	3.16	0.	1093.76	95052.7	TD =	0.5
123	DRAIN	3.16	113.50	81.48	96488.8	DC =	3.2
70	ENTRY	3.23	462.70	1270.82	1436.1		
						PUMP	
33	FW IN	0.	0.	0.	3086951.0		
87	LEAKAGE	0.	0.	0.	0.		
27	FW OUT	0.	0.	0.	3086951.0		
						FW TO BOILER	
1	FW IN	2569.50	506.50	494.97	3982651.3	S+L =	-4124.

T U R B I N E   E X P A N S I O N

TL		PRESS	TEMP	ENTH	FLOW		
						MAIN STEAM LINE	
71	EXIT	0.	0.	1466.95	0.		
36	THROTTLE	2393.30	1008.80	1466.95	3978527.8		
						VALVE STEM LKG	
						SQRT P/V =	85.758
37	LO NO 1	348.90	890.69	1466.95	2262.0	C =	55.815
						SQRT P/V =	12.437
38	LO NO 2	0.	0.	0.	2524.6	C =	202.994
						EXP TO STG	1
40	SHELL	1212.30	846.80	1408.33	3940931.7		
112	EXTR	0.	0.	1408.33	32809.6		
						PACKING NO	2
						SQRT P/V =	.115E 19
42	LO NO 1	82.75	648.00	1354.59	9408.3	C =	0.000
						SQRT P/V =	3.238
43	LO NO 2	15.38	638.80	1353.96	2923.8	C =	1072.812
						SQRT P/V =	0.602
100	LO NO 3	0.	0.	0.	550.4	C =	1839.689

TL	PRESS	TEMP	ENTH	FLOW	
					EXP TO STG 4
41 SHELL	706.41	0.	1357.92	3610828.5	
79 EXTR	700.50	720.60	1357.92	317220.6	
					PACKING NO 1
					SQRT P/V = 15.879
46 LO NO 1	81.86	562.40	1312.19	3333.5	C = 381.776
					SQRT P/V = 3.341
47 LO NO 2	15.33	542.60	1307.63	2178.3	C = 816.661
					SQRT P/V = 0.628
100 LO NO 3	0.	0.	0.	550.4	C = 1839.689
					EXPAND TO EXHAUST
49 EXH	378.40	565.50	1288.98	3629343.8	
80 EXTR	378.40	565.50	1288.98	311995.5	
50 TO RHT	378.40	565.50	1288.98	3317348.3	
					REHEATER 1
BEFORE LO	0.08	0.	1525.64	0.	
37 ENTRY					
84 AFTER LO	348.70	1001.60	1525.60	3319610.3	PCTDP = 7.849
					EXPAND TO BOWL
51 ENTRY	341.73	1000.61	1525.28	3327842.3	
125 ENTRY	349.70	754.00	1395.11	8232.0	
					EXP TO STG 11
52 SHELL	155.15	0.	1420.36	3182051.3	
53 EXTR	153.60	804.20	1429.57	145791.1	
					PACKING NO 3
					SQRT P/V = 3.148
57 LO NO 1	15.33	630.20	1349.79	1261.2	C = 1192.521
					SQRT P/V = 0.602
58 LO NO 2	15.33	644.40	1356.68	1392.4	C = 4139.534
					SQRT P/V = 0.598
100 LO NO 3	0.	0.	0.	550.4	C = 1839.689
					SQRT P/V = 0.
100 LO NO 4	0.	0.	0.	550.4	C = 1839.689

TL	PRESS	TEMP	ENTH	FLOW	
					EXPAND TO EXHAUST
56 EXH	79.47	622.10	1341.89	2864750.7	
55 EXTR	81.53	624.50	1342.95	313546.2	
					EXPAND TO BOWL
59 ENTRY	79.47	622.10	1341.89	2864750.7	
					EXP TO STG 15
61 SHELL	43.95	0.	1284.38	2781981.6	
60 EXTR	43.51	531.20	1299.87	82769.1	
					EXP TO STG 16
63 SHELL	26.87	0.	1239.88	2607188.3	
62 EXTR	26.55	426.60	1251.06	174793.3	
					EXP TO STG 18
65 SHELL	7.83	0.	1146.72	2512065.5	
64 EXTR	7.71	244.20	1168.17	95122.8	
					EXP TO STG 19
107 SHELL	3.32	0.	1093.63	2417012.8	
106 EXTR	3.26	0.	1093.76	95052.7	
					CONDENSER
					SHAFT 1
108 TB EXH	1.01	102.18	1035.9861	2417012.8	LEVL = -4848.2
76 ENTRY	0.	0.	0.	312405.1	
22 ENTRY	7.34	165.00	132.97	352685.2	
122 DRAIN	0.	0.	0.	3086951.3	
					GENERATOR 1
					SHAFT 1

MEASURED LOAD = 599736.0 PF = 0.996 H2 = 63.00
SHAFT 1 KW = 609427.8 FL =4353.0 GL = 5338.8

TEST CYCLE HEAT BALANCE

P E R F O R M A N C E

TRUNKLINE OUTPUT

TL	P	T	H	Q	SV	SP	PV	TR
1	2569.5	506.5	495.0	3982651.	0.0202	0.	0.	-4123.5
2	695.6	718.8	1357.1	317221.	0.9335	502.379	-4.121	216.4
3	695.6	444.2	423.9	317221.	0.0193	0.	4.300	0.
4	2569.5	439.9	420.6	3982651.	0.	0.	0.	0.
5	370.5	564.6	1289.2	311995.	1.5336	437.166	-2.734	127.4
6	370.5	369.7	342.9	629216.	0.0182	0.	5.800	0.
7	2569.5	363.9	340.1	3982651.	0.	0.	0.	0.
8	153.2	801.9	1428.4	145791.	4.8453	360.098	-3.802	441.8
9	153.2	320.5	291.0	775007.	0.0177	0.	5.200	0.
10	2698.5	315.3	290.2	3982651.	0.0174	0.	0.	0.
11	0.	0.	0.	3953704.	0.	0.	0.	0.
12	78.9	619.2	1340.5	179814.	8.0518	311.102	522.800	308.1
13	87.9	271.8	240.9	2999608.	0.0172	0.	0.	0.
14	130.6	271.8	241.0	2999608.	0.0172	1.014	0.	130.6
15	42.8	516.0	1292.5	82769.	13.4585	271.362	-0.438	244.6
16	42.8	245.5	214.1	82769.	0.0170	0.	3.000	0.
17	130.6	242.5	211.2	2999608.	0.	0.	0.	0.
18	25.6	416.3	1246.2	174793.	20.2241	241.366	-1.134	174.9
19	25.6	184.6	152.7	257562.	0.0165	0.	7.100	0.
20	130.6	177.5	145.8	2999608.	0.	0.	0.	0.
21	7.3	237.2	1165.0	95123.	56.2127	178.945	1.445	58.3
22	7.3	165.0	133.0	352685.	0.0164	0.	21.900	0.
23	130.6	143.1	111.4	2999608.	0.	0.	0.	0.
24	1500.0	223.7	195.2	0.	0.0167	0.	0.	0.
25	3.2	0.	1093.8	95053.	0.	143.570	0.470	-143.6
26	169.2	110.3	78.7	2999608.	0.0162	0.	0.	0.
27	0.	0.	0.	3086951.	0.	0.	0.	0.
28	0.	0.	0.	17687.	0.	0.	0.	0.
29	0.	0.	0.	40709.	0.	0.	0.	0.
30	0.	0.	0.	58396.	0.	0.	0.	0.
31	2697.9	302.6	277.3	0.	0.0173	0.	0.	0.
33	0.	0.	0.	3086951.	0.	0.	0.	0.
34	0.	0.	0.	-4124.	0.	0.	0.	0.
35	2698.5	315.3	290.2	3982651.	0.0174	0.	0.	0.
36	2393.3	1008.8	1466.9	3978528.	0.3254	1466.949	85.758	0.
37	348.9	890.7	1467.0	2262.	2.2557	0.780	12.437	55.8
38	0.	0.	0.	2525.	0.	0.	0.	203.0
39	2393.3	0.	1466.9	3973741.	0.3254	0.	85.758	0.
40	1212.3	846.8	1408.3	3940932.	0.5852	134.812	45.514	0.
41	706.4	0.	1357.9	3610828.	0.9205	504.908	27.703	828.1
42	82.7	648.0	1354.6	9408.	7.8901	0.779	3.238	0.0
43	15.4	638.8	1354.0	2924.	42.4579	0.	0.602	1072.8
45	0.	0.	0.	24578.	0.	0.	0.	0.
46	81.9	562.4	1312.2	3333.	7.3319	0.704	3.341	381.8
47	15.3	542.6	1307.6	2178.	38.8341	0.	0.628	816.7
48	0.	0.	0.	3635406.	0.	0.	0.	0.
49	378.4	565.5	1289.0	3629344.	1.5007	439.200	15.879	0.
50	378.4	565.5	1289.0	3317348.	0.	0.	0.	0.
51	341.7	1000.6	1525.3	3327842.	2.5069	0.	11.678	0.

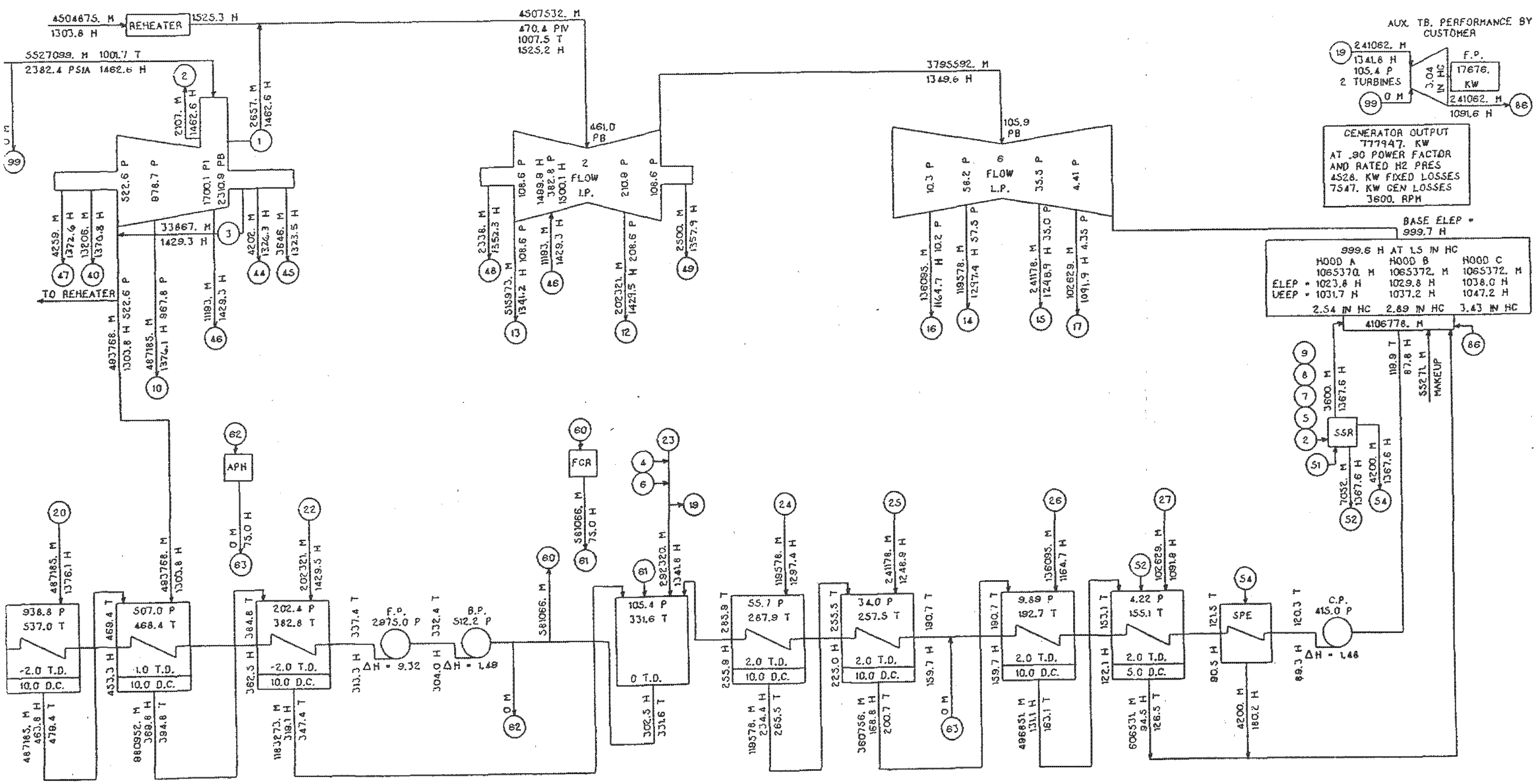
TL	P	T	H	Q	SV	SP	PV	TR
52	155.1	0.	1420.4	3182051.	4.7345	361.563	5.725	781.6
53	153.6	804.2	1429.6	145791.	4.8417	360.305	5.632	0.
54	79.5	622.1	1341.9	3178297.	8.0179	0.	3.148	0.
55	81.5	624.5	1343.0	313546.	7.8311	313.353	0.	0.
56	79.5	622.1	1341.9	2864751.	8.0179	311.581	0.	0.
57	15.3	630.2	1349.8	1261.	42.2607	0.	0.602	1192.5
58	15.3	644.4	1356.7	1392.	42.8154	0.	0.598	4139.5
59	79.5	622.1	1341.9	2864751.	8.0179	0.	3.148	0.
60	43.5	531.2	1299.9	82769.	13.4503	272.370	1.799	0.
61	43.9	0.	1284.4	2781982.	12.9301	273.346	1.844	1066.6
62	26.5	426.6	1251.1	174793.	19.7239	243.420	1.160	0.
63	26.9	0.	1239.9	2607188.	19.0663	244.527	1.187	1086.5
64	7.7	244.2	1168.2	95123.	54.0014	181.205	0.378	0.
65	7.8	0.	1146.7	2512066.	49.9895	182.295	0.396	1054.9
66	15.1	613.2	1341.6	8844.	42.1195	0.	0.	0.
67	78.9	314.0	1184.4	0.	5.5677	0.	0.	0.
68	1.3	480.0	1279.1	0.	443.4005	0.	0.	0.
69	3.2	462.7	1270.8	0.	169.7525	0.	0.	0.
70	3.2	462.7	1270.8	1436.	169.7525	0.	0.	0.
71	0.	0.	1466.9	0.	0.	0.	0.	0.
72	0.	0.	0.	523.	0.	0.	0.	0.
73	0.	0.	0.	-4848.	0.	0.	0.	0.
75	0.	0.	0.	5542.	0.	0.	0.	0.
76	0.	0.	0.	312405.	0.	0.	0.	0.
79	700.5	720.6	1357.9	317221.	0.9283	503.161	27.470	0.
80	378.4	565.5	1289.0	311995.	0.	0.	0.	0.
81	15.1	613.2	1341.6	0.	42.0916	0.	0.	0.
82	0.	0.	0.	3317348.	0.	0.	0.	0.
83	78.9	311.1	1182.8	202.	0.	0.	0.	0.
84	348.7	1001.6	1525.6	3319610.	2.4566	7.849	11.914	795.6
86	0.	0.	0.	87343.	0.	0.	0.	0.
88	0.	0.	0.	1436.	0.	0.	0.	0.
90	108.9	311.5	281.6	0.	0.0176	0.	0.	0.
91	114.1	248.1	216.8	1163892.	0.0170	0.647	0.	114.1
95	1.0	102.2	1028.5	2417013.	304.8236	1035.986	2.063	613.5
99	0.	0.	0.	6055.	0.	0.	0.	0.
100	0.	0.	0.	550.	0.	0.	0.	1839.7
104	2569.5	506.5	495.0	3985723.	0.0202	1.028	0.	2569.5
106	3.3	0.	1093.8	95053.	106.4798	144.763	0.175	0.
107	3.3	0.	1093.6	2417013.	104.7646	0.	0.178	1122.8
108	1.0	102.2	1036.0	2417013.	329.4876	1035.986	2.063	-4848.2
109	0.	0.	246.5	1938899.	0.	0.	0.	0.
111	78.9	311.5	281.6	5117596.	5.5453	0.	-0.398	0.
112	0.	0.	1408.3	32810.	0.	0.	0.	0.
113	0.	0.	0.	3928049.	0.	0.	0.115E 19	0.
114	477.5	108.5	77.7	14266.	0.0161	0.624	0.	477.5
115	477.5	108.5	77.7	15022.	0.0161	0.624	0.	477.5
116	477.5	108.5	77.7	25866.	0.0161	0.623	0.	477.5
117	477.5	108.5	77.7	14945.	0.0161	0.660	0.	477.5
118	477.5	108.5	77.7	0.	0.0161	0.	0.	0.
119	477.5	108.5	77.7	17244.	0.0161	0.660	0.	477.5
120	0.	0.	0.	4787.	0.	0.	0.	0.
122	0.	0.	0.	3086951.	0.	0.	0.	0.
123	3.2	113.5	81.5	96489.	0.0162	0.	3.200	0.
125	349.7	754.0	1395.1	8232.	2.0007	0.628	0.	345.5
130	0.	0.	0.	146474.	0.	0.	0.	0.
131	79.9	619.2	1340.4	70599.	7.9520	1.018	0.	79.9
132	80.1	618.9	1340.3	75875.	7.9276	1.019	0.	80.1
133	0.	0.	0.	145923.	0.	0.	0.	0.
201	0.1	0.	1525.6	0.	0.	236.662	0.	0.

:. 9H

TURBINE AND EXTRACTION ARRANGEMENT IS SCHEMATIC ONLY

CONTRACT CYCLE HEAT BALANCE TEST No.10

THE VALUE OF GENERATOR OUTPUT SHOWN ON THIS HEAT BALANCE IS AFTER ALL POWER FOR EXCITATION AND OTHER TURBINE-GENERATOR AUXILIARIES HAS BEEN DEDUCTED.



$$\text{POINT RATE} = \frac{\begin{array}{l} 4106778.\,(1.48) \\ +\,5527.1\,(718.2 - 532.9) \\ +\,5527099.\,(1462.6 - 532.9) \\ +\,4504875.\,(1525.3 - 1303.8) \end{array}}{777947.} = 7897.2\ \frac{\text{BTU}}{\text{KW-HR}}$$

LEGEND - CALCULATIONS BASED ON 1967 ASME STEAM TABLES
M - FLOW-LB/HR
P - PRESSURE-PSIA
H - ENTHALPY-BTU/LB
T - TEMPERATURE-F DEGREES

9624T 1 0 1

KW / / IN HC ABS.
CONTRACT CYCLE HEAT BALANCE TEST NO.10
TC6F 30.0 IN. LSB 3600 RPM
2400.0 PSIA 1000. / 1000. T
GEN- 991000. KVA .90 PF LIQ

ERAL ELECTRIC COMPANY, SCHENECTADY N.Y.

TR-~~9~~ 10

5/14/87
FIG. 9H

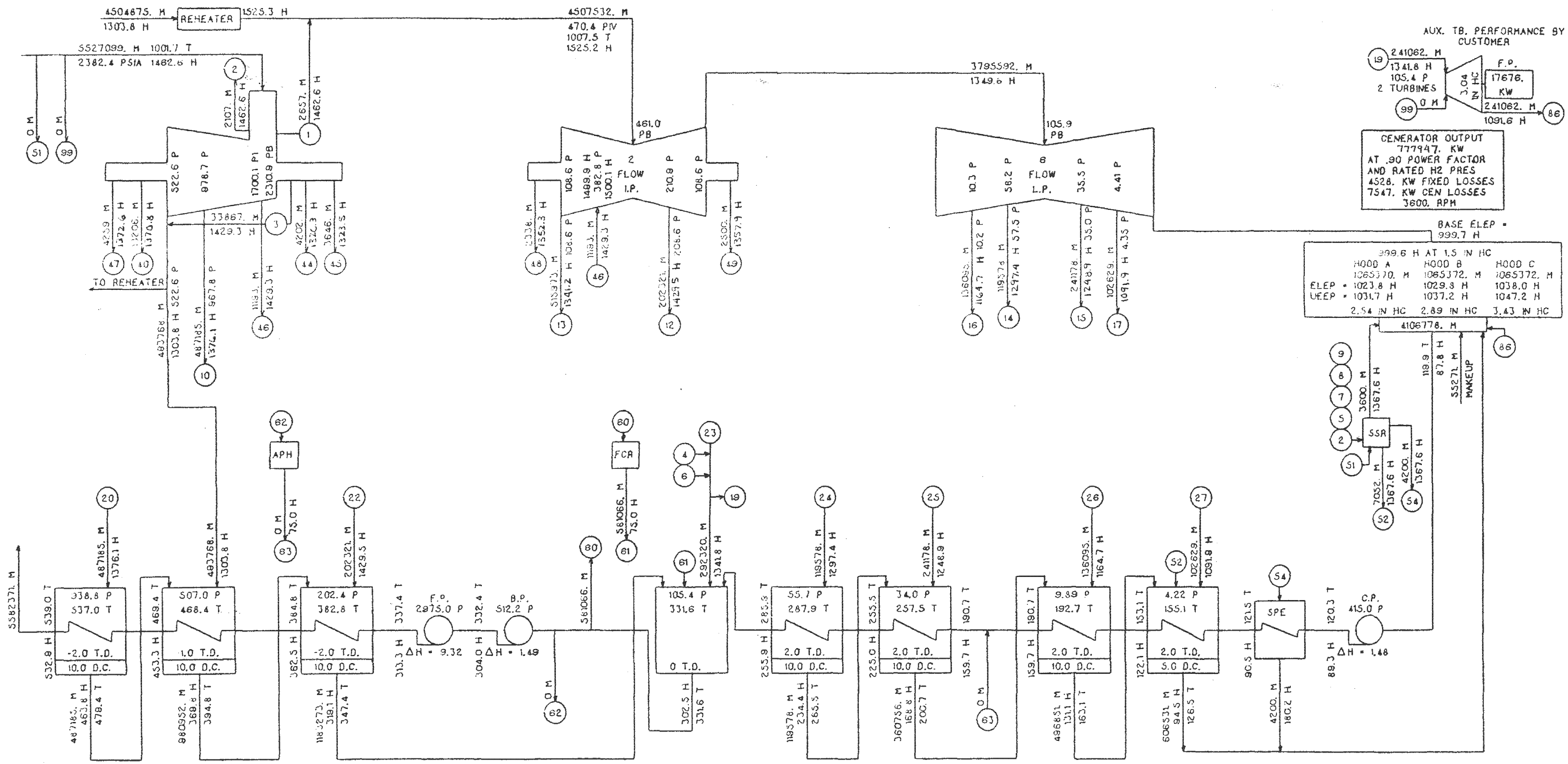
IP14_005011

FIG. 9H

TURBINE AND EXTRACTION ARRANGEMENT IS SCHEMATIC ONLY

CONTRACT CYCLE HEAT BALANCE TEST No. 10

THE VALUE OF GENERATOR OUTPUT SHOWN ON THIS HEAT BALANCE IS AFTER ALL POWER FOR EXCITATION AND OTHER TURBINE-GENERATOR AUXILIARIES HAS BEEN DEDUCTED.



$$\frac{\begin{array}{l}4106778.\ (1.48)\\ +\ 5527.1\ (718.2 - 532.9)\\ +\ 5527099.\ (1462.6 - 532.9)\\ +\ 4504875.\ (1525.3 - 1303.8)\end{array}}{777947.} = 7897.2\ \frac{BTU}{KW\text{-}HR}$$

VALVE BEST POINT NET HEAT RATE

LEGEND - CALCULATIONS BASED ON 1967 ASME STEAM TABLES
M - FLOW-LB/HR
P - PRESSURE-PSIA
H - ENTHALPY-BTU/LB
T - TEMPERATURE-F DEGREES

9624T 1 0 1

KW / / IN HC ABS.
CONTRACT CYCLE HEAT BALANCE TEST NO.10
TC6F 30.0 IN. LSB 3600 RPM
2400.0 PSIA 1000. / 1000. T
GEN- 991000. KVA .90 PF LIQ

GENERAL ELECTRIC COMPANY, SCHENECTADY N.Y.

5/14/87

Fig. 9H

IP14_005012

TEST CYCLE HEAT BALANCE

VALVE POINT 3RD VL	05/16/87	TEST POINT 10
INTERMOUNTAIN PWR PROJECT		UNIT #2
820000. KW	TC6F-30 IN LSB	TURBINE NO 270T151
2400. PSIG	1000./ 1000. F	2.300 IN HG ABS

CALCULATED USING ASME STEAM TABLES

COMBINED TURBINE-CYCLE PERFORMANCE

	TEST CONDITIONS	* RATED CONDITIONS
TOTAL LOAD	789272.	788480.
HEAT RATE	7784.0	7791.8
THROTTLE FLOW	5527099.	5612929.

TURBINE THERMAL PERFORMANCE

	HIGH PRESS TB		REHEAT TB		
			IP TB		LP TB
	THROTTLE	COLD RHT	INLET	EXH	EXH
PRESS	2382.40	512.70	473.00	107.50	2.956
TEMP	1001.70	606.50	1007.01	624.60	114.54
ENTH	1462.61	1302.07	1524.88	1341.37	1030.66
ENTR	1.5351		1.7462	1.7618	
EFF	86.188		91.698		93.468

ABSCISSA PHPX/PT=0.2152 P1STSTG/PT=0.7131 VAN= 588.8

THRU FLOW PERFORMANCE OF CONDENSING SECTION SHAFT NO 1

	TOTAL TB ENERGY BALANCE		LP TB ENERGY BALANCE	
	RHT TB	LP TB	RHT TB	LP TB
AE	528.77	336.32		
H ELEP	1030.66		1030.66	
H UEEP	1038.10		1038.10	
EFF ELEP	93.47	92.39	93.47	92.39
EFF UEEP	92.06	90.17	92.06	90.17
VAN	588.80		588.80	

* LOAD AND HEAT RATE AT RATED POWER FACTOR AND H2 PRESS. FLOW AT RATED THROTTLE PRESS. OF 2412.2 PSIA AND TEMP. OF 1000 F.

T G L PERFORMANCE OF CONDENSING SECTION SHAFT NO 1

	TOTAL TB ENERGY BALANCE		LP TB ENERGY BALANCE	
	RHT TB	LP TB	RHT TB	LP TB
H ELEP	1032.68		1032.68	
H UEEP	1040.16		1040.16	
EFF ELEP	93.08	91.78	93.08	91.78
EFF UEEP	91.67	89.56	91.67	89.56
VAN	590.06		590.06	

STAGE FLOW FUNCTION

STG NO	SHELL PRESS	ONE VEL HD	PCT DELTA P	FLANGE PRESS	NOZ AREA	Q/AP H FLG	QFS	Q/AP H SHL
1	1698.80	0.	0.	0.	86.6	0.	5477243.	1007.5
4	973.63	3.438	1.11	962.80	157.4	843.3	4964326.	838.5
RH 1	473.00	0.	0.	0.	350.2	0.	4522392.	798.5
8	463.54	0.	0.	0.	350.2	0.	4533585.	816.7
11	210.70	0.720	1.09	208.40	711.2	791.2	4326377.	782.0
15	107.50	0.	0.	0.	807.6	0.	3884894.	1128.6
15	59.35	0.245	1.20	58.64	1414.8	1089.7	3762662.	1066.9
16	36.17	0.164	1.31	35.70	2021.4	1106.4	3514296.	1086.2
18	10.57	0.052	1.42	10.42	6018.0	1091.1	3386760.	1052.5
19	4.50	0.023	1.46	4.44	12096.0	1133.7	3267123.	1125.3

TL		PRESS	TEMP	ENTH	FLOW		

F E E D W A T E R   C Y C L E

						HEATER	8
4	FW IN	2658.10	468.90	452.50	5487507.4	CLOSED	
2	EXTR	953.50	771.80	1374.82	495782.4	TD =	-1.9
3	DRAIN	953.50	475.10	458.86	495782.4	DC =	6.2
						HEATER	7
7	FW IN	2658.10	387.10	364.43	5487507.4	CLOSED	
5	EXTR	501.00	605.40	1302.37	470775.2	TD =	-1.7
6	DRAIN	501.00	394.70	369.68	966557.6	DC =	7.6
3	ENTRY	953.50	475.10	458.86	495782.4		
						HEATER	6
10	FW IN	2742.60	337.40	312.94	5487507.4	CLOSED	
8	EXTR	207.00	806.50	1428.55	207207.6	TD =	-2.4
9	DRAIN	207.00	344.30	315.90	1173765.2	DC =	6.9
6	ENTRY	501.00	394.70	369.68	966557.6		
						PUMP	
11	FW IN	0.	0.	0.	5486207.6		
86	SEAL INJ	0.	0.	0.	108611.9		
30	SEAL RET	0.	0.	0.	63704.0		
32	LEAKAGE	0.	0.	0.	0.		
24	EXTR	1500.00	200.00	171.47	0.		
35	FW OUT	2742.60	337.40	312.94	5531115.4		
						HEATER	5
13	FW IN	116.30	290.10	259.64	4063570.8	OPEN	
12	EXTR	107.10	624.30	1341.25	248885.5	STD =	-257.2
111	DRAIN	107.10	333.10	304.04	6437598.4	SC =	-0.3
109	ENTRY	0.	0.	267.62	2125156.0		
						HEATER	4
17	FW IN	161.80	258.80	227.79	4063571.6	CLOSED	
15	EXTR	57.56	520.40	1293.41	122231.4	TD =	-0.1
16	DRAIN	57.56	263.00	231.85	122231.4	DC =	4.2
						HEATER	3
20	FW IN	161.80	191.60	159.99	4063571.6	CLOSED	
18	EXTR	34.53	419.30	1246.53	248366.5	TD =	-0.3
19	DRAIN	34.53	200.30	168.44	370597.9	DC =	8.7
16	ENTRY	57.56	263.00	231.85	122231.4		
						HEATER	2
23	FW IN	161.80	155.80	124.14	4063571.6	CLOSED	
21	EXTR	10.00	237.30	1164.21	127535.5	TD =	1.6
22	DRAIN	10.00	162.90	130.87	498133.5	DC =	7.1
19	ENTRY	34.53	200.30	168.44	370597.9		

```
  TL            PRESS       TEMP      ENTH       FLOW

                                                          STM SEAL REG
 88  FLOW TO    0.         0.         0.         3136.5  CALCULATED
 70  TDV        4.47     655.80    1362.82       3136.5  TO HEATER
 68  TDV        1.73     480.00    1279.10          0.   TO CONDENSER
   NOT CODED FOR MU   MEAS TOTAL FLOW =            0.

                                                         HEATER         1
 26 FW IN     206.50     120.80      89.29  4063571.6  CLOSED
 25 EXTR        4.32       0.      1093.23   119637.6  TD =         0.4
123 DRAIN       4.32     126.50      94.46   620907.5  DC =         5.7
 22 ENTRY      10.00     162.90     130.87   498133.5
 70 ENTRY       4.47     655.80    1362.82     3136.5

                                                          PUMP
 33  FW IN      0.         0.         0.    4172183.4
 87  LEAKAGE    0.         0.         0.         0.
 27  FW OUT      0.         0.         0.    4172183.4

                                                          FW TO BOILER

  1  FW IN   2658.10     540.70     535.26  5487507.4  S+L =  -4016.

                    T U R B I N E   E X P A N S I O N

                                                          MAIN STEAM LINE
 71 EXIT        0.         0.      1462.61        0.
 36 THROTTLE 2382.40    1001.70    1462.61  5527099.1

                                                          VALVE STEM LKG

                                                       SQRT P/V =   85.663
 37 LO NO  1  473.20     890.85    1462.61     2643.9  C =      55.622

                                                       SQRT P/V =   16.934
 38 LO NO  2    0.         0.         0.       2120.9  C =     125.247

                                                          EXP TO STG     1
 40 SHELL     1698.80    911.18    1428.41  5477243.4
112 EXTR        0.         0.      1428.41    45090.9

                                                         PACKING NO     2

                                                       SQRT P/V =.115E 19
 42 LO NO  1  112.00     682.00    1369.92    12743.4  C =       0.000

                                                       SQRT P/V =    4.322
 43 LO NO  2   16.82     675.50    1371.73     3749.2  C =    1016.109

                                                       SQRT P/V =    0.647
100 LO NO  3    0.         0.         0.        642.7  C =    1973.597
```

TL	PRESS	TEMP	ENTH	FLOW	
					EXP TO STG 4
41 SHELL	973.63	0.	1375.56	4964325.7	
79 EXTR	962.80	773.80	1375.56	495782.4	
					PACKING NO 1
					SQRT P/V = 21.239
46 LO NO 1	110.65	593.20	1325.46	3985.7	C = 362.561
					SQRT P/V = 4.457
47 LO NO 2	16.74	574.10	1322.64	3072.0	C = 833.450
					SQRT P/V = 0.676
100 LO NO 3	0.	0.	0.	642.7	C = 1973.597
					EXPAND TO EXHAUST
49 EXH	512.70	606.50	1302.07	4990523.2	
80 EXTR	512.70	606.50	1302.07	470775.2	
50 TO RHT	512.70	606.50	1302.07	4519748.0	
					REHEATER 1
BEFORE LO	0.08	0.	1525.18	0.	
37 ENTRY					
84 AFTER LO	473.00	1007.50	1525.15	4522391.9	PCTDP = 7.743
					EXPAND TO BOWL
51 ENTRY	463.54	1006.50	1524.88	4533584.9	
125 ENTRY	473.85	807.40	1418.07	11193.0	
					EXP TO STG 11
52 SHELL	210.70	0.	1420.51	4326377.3	
53 EXTR	208.40	808.20	1429.36	207207.6	
					PACKING NO 3
					SQRT P/V = 4.262
57 LO NO 1	16.74	638.60	1353.78	1732.9	C = 1153.252
					SQRT P/V = 0.655
58 LO NO 2	16.73	650.30	1359.46	1897.0	C = 4857.146
					SQRT P/V = 0.651
100 LO NO 3	0.	0.	0.	642.7	C = 1973.597
					SQRT P/V = 0.
100 LO NO 4	0.	0.	0.	642.7	C = 1973.597

TL	PRESS	TEMP	ENTH	FLOW	
					EXPAND TO EXHAUST
56 EXH	107.50	624.60	1341.37	3884893.9	
55 EXTR	110.30	627.70	1342.75	436568.0	
					EXPAND TO BOWL
59 ENTRY	107.50	624.60	1341.37	3884893.9	
					EXP TO STG 15
61 SHELL	59.35	0.	1284.30	3762662.5	
60 EXTR	58.64	532.50	1299.25	122231.4	
					EXP TO STG 16
63 SHELL	36.17	0.	1239.64	3514296.0	
62 EXTR	35.70	427.90	1250.55	248366.5	
					EXP TO STG 18
65 SHELL	10.57	0.	1146.86	3386760.5	
64 EXTR	10.42	241.60	1166.11	127535.5	
					EXP TO STG 19
107 SHELL	4.50	0.	1093.62	3267122.9	
106 EXTR	4.44	0.	1093.23	119637.6	

TL	PRESS	TEMP	ENTH	FLOW	
					CONDENSER
					SHAFT 1
108 TB EXH	1.45	114.54	1038.0987	3267122.9	LEVL = -4030.2
76 ENTRY	0.	0.	0.	901030.3	
122 DRAIN	0.	0.	0.	4172183.4	
					GENERATOR 1
					SHAFT 1

MEASURED LOAD = 789272.0 PF = 0.998 H2 = 63.00
SHAFT 1 KW = 800405.9 FL =4353.0 GL = 6780.9

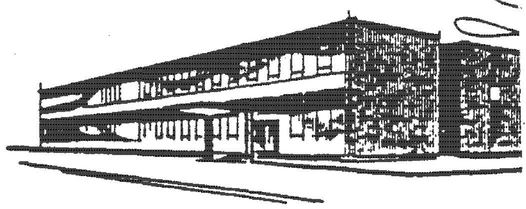
TEST CYCLE HEAT BALANCE

P E R F O R M A N C E

TRUNKLINE OUTPUT

TL	P	T	H	Q	SV	SP	PV	TR
1	2658.1	540.7	535.3	5487507.	0.0210	0.	0.	-4016.3
2	953.5	771.8	1374.8	495782.	0.7020	538.835	-1.865	233.0
3	953.5	475.1	458.9	495782.	0.0198	0.	6.200	0.
4	2658.1	468.9	452.5	5487507.	0.	0.	0.	0.
5	501.0	605.4	1302.4	470775.	1.1641	467.215	-1.685	138.2
6	501.0	394.7	369.7	966558.	0.0185	0.	7.600	0.
7	2658.1	387.1	364.4	5487507.	0.	0.	0.	0.
8	207.0	806.5	1428.5	207208.	3.5841	384.698	-2.402	421.8
9	207.0	344.3	315.9	1173765.	0.0179	0.	6.900	0.
10	2742.6	337.4	312.9	5487507.	0.0176	0.	0.	0.
11	0.	0.	0.	5486208.	0.	0.	0.	0.
12	107.1	624.3	1341.2	248885.	5.9385	332.821	-257.200	291.5
13	116.3	290.1	259.6	4063571.	0.0174	0.	0.	0.
14	161.8	290.1	259.7	4063572.	0.0174	1.014	0.	161.8
15	57.6	520.4	1293.4	122231.	10.0231	290.011	-0.089	230.4
16	57.6	263.0	231.9	122231.	0.0171	0.	4.200	0.
17	161.8	258.8	227.8	4063572.	0.	0.	0.	0.
18	34.5	419.3	1246.5	248367.	14.9977	258.490	-0.310	160.8
19	34.5	200.3	168.4	370598.	0.0166	0.	8.700	0.
20	161.8	191.6	160.0	4063572.	0.	0.	0.	0.
21	10.0	237.3	1164.2	127536.	41.1588	193.200	1.600	44.1
22	10.0	162.9	130.9	498133.	0.0164	0.	7.100	0.
23	161.8	155.8	124.1	4063572.	0.	0.	0.	0.
24	1500.0	200.0	171.5	0.	0.0166	0.	0.	0.
25	4.3	0.	1093.2	119638.	0.	156.155	0.355	-156.2
26	206.5	120.8	89.3	4063572.	0.0162	0.	0.	0.
27	0.	0.	0.	4172183.	0.	0.	0.	0.
28	0.	0.	0.	19516.	0.	0.	0.	0.
29	0.	0.	0.	44188.	0.	0.	0.	0.
30	0.	0.	0.	63704.	0.	0.	0.	0.
31	2749.1	336.5	312.0	43608.	0.0176	1.001	0.	2749.1
33	0.	0.	0.	4172183.	0.	0.	0.	0.
34	0.	0.	0.	-4016.	0.	0.	0.	0.
35	2742.6	337.4	312.9	5531115.	0.0176	0.	0.	0.
36	2382.4	1001.7	1462.6	5527099.	0.3247	0.133E 37	85.663	0.
37	473.2	890.9	1462.6	2644.	1.6502	0.780	16.934	55.6
38	0.	0.	0.	2121.	0.	0.	0.	125.2
39	2382.4	0.	1462.6	5522334.	0.3247	0.	85.663	0.
40	1698.8	911.2	1428.4	5477243.	0.4311	142.656	62.774	0.
41	973.6	0.	1375.6	4964326.	0.6882	541.884	37.612	838.5
42	112.0	682.0	1369.9	12743.	5.9948	0.779	4.322	0.0
43	16.8	675.5	1371.7	3749.	40.1225	0.	0.647	1016.1
45	0.	0.	0.	33898.	0.	0.	0.	0.
46	110.7	593.2	1325.5	3986.	5.5700	0.703	4.457	362.6
47	16.7	574.1	1322.6	3072.	36.6838	0.	0.676	833.5
48	0.	0.	0.	4998224.	0.	0.	0.	0.
49	512.7	606.5	1302.1	4990523.	1.1366	469.601	21.239	0.
50	512.7	606.5	1302.1	4519748.	0.	0.	0.	0.
51	463.5	1006.5	1524.9	4533585.	1.8455	0.	15.851	0.

TL	P	T	H	Q	SV	SP	PV	TR
52	210.7	0.	1420.5	4326377.	3.4816	386.612	7.779	782.0
53	208.4	808.2	1429.4	207208.	3.5647	385.268	7.646	0.
54	107.5	624.6	1341.4	4321462.	5.9178	0.	4.262	0.
55	110.3	627.7	1342.7	436568.	5.7827	334.988	0.	0.
56	107.5	624.6	1341.4	3884894.	5.9178	333.095	0.	0.
57	16.7	638.6	1353.8	1733.	38.9943	0.	0.655	1153.3
58	16.7	650.3	1359.5	1897.	39.4367	0.	0.651	4857.1
59	107.5	624.6	1341.4	3884894.	5.9178	0.	4.262	0.
60	58.6	532.5	1299.3	122231.	9.9634	291.217	2.426	0.
61	59.4	0.	1284.3	3762662.	9.5508	292.154	2.493	1066.9
62	35.7	427.9	1250.6	248367.	14.6492	260.454	1.561	0.
63	36.2	0.	1239.6	3514296.	14.1191	261.500	1.601	1086.2
64	10.4	241.6	1166.1	127536.	39.7310	195.160	0.512	0.
65	10.6	0.	1146.9	3386760.	36.9731	196.276	0.535	1052.5
66	16.4	629.1	1349.2	9435.	39.4093	0.	0.	0.
67	107.1	335.6	1190.0	0.	4.1713	0.	0.	0.
68	1.7	480.0	1279.1	0.	323.7902	0.	0.	0.
69	4.5	655.8	1362.8	919.	148.6988	0.	0.	0.
70	4.5	655.8	1362.8	3137.	148.6988	0.	0.	0.
71	0.	0.	1462.6	0.	0.	0.	0.	0.
72	0.	0.	0.	-257.	0.	0.	0.	0.
73	0.	0.	0.	-4030.	0.	0.	0.	0.
75	0.	0.	0.	5579.	0.	0.	0.	0.
76	0.	0.	0.	901030.	0.	0.	0.	0.
79	962.8	773.8	1375.6	495782.	0.6961	540.001	37.192	0.
80	512.7	606.5	1302.1	470775.	0.	0.	0.	0.
81	16.4	629.1	1349.2	0.	39.4093	0.	0.	0.
82	0.	0.	0.	4519748.	0.	0.	0.	0.
83	107.1	332.8	1188.4	271.	0.	0.	0.	0.
84	473.0	1007.5	1525.1	4522392.	1.8085	7.743	16.172	798.5
86	0.	0.	0.	108612.	0.	0.	0.	0.
88	0.	0.	0.	3137.	0.	0.	0.	0.
90	137.1	333.1	304.1	0.	0.0178	0.	0.	0.
91	131.6	239.4	208.1	951391.	0.0169	0.647	0.	131.6
95	1.5	114.5	1030.7	3267123.	216.4359	1038.099	2.956	588.8
99	0.	0.	0.	7071.	0.	0.	0.	0.
100	0.	0.	0.	643.	0.	0.	0.	1973.6
104	2658.1	540.7	535.3	5393140.	0.0210	1.028	0.	2658.1
106	4.4	0.	1093.2	119638.	79.2923	157.242	0.237	0.
107	4.5	0.	1093.6	3267123.	78.1822	0.	0.240	1125.3
108	1.5	114.5	1038.1	3267123.	234.8375	1038.099	2.956	-4030.2
109	0.	0.	267.6	2125156.	0.	0.	0.	0.
111	107.1	333.1	304.0	6437598.	4.1542	0.	-0.279	0.
112	0.	0.	1428.4	45091.	0.	0.	0.	0.
113	0.	0.	0.	5460108.	0.	0.	0.115E 19	0.
114	436.9	119.7	88.8	14740.	0.0162	0.624	0.	436.9
115	436.9	119.7	88.8	13690.	0.0162	0.624	0.	436.9
116	436.9	119.7	88.8	27343.	0.0162	0.623	0.	436.9
117	436.9	119.7	88.8	13384.	0.0162	0.660	0.	436.9
118	436.9	119.7	88.8	19274.	0.0162	0.660	0.	436.9
119	436.9	119.7	88.8	20182.	0.0162	0.660	0.	436.9
120	0.	0.	0.	4765.	0.	0.	0.	0.
122	0.	0.	0.	4172183.	0.	0.	0.	0.
123	4.3	126.5	94.5	620908.	0.0162	0.	5.700	0.
125	473.9	807.4	1418.1	11193.	1.5335	0.628	0.	467.9
130	0.	0.	0.	204412.	0.	0.	0.	0.
131	108.3	624.0	1341.0	99289.	5.8700	1.018	0.	108.3
132	108.4	623.8	1340.9	105122.	5.8633	1.019	0.	108.4
133	0.	0.	0.	203769.	0.	0.	0.	0.
201	0.1	0.	1525.2	0.	0.	223.110	0.	0.



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Turbine Technology

SCHENECTADY, NEW YORK

PERFORMANCE TEST REPORT
INTERMOUNTAIN POWER PROJECT
UNIT NO.2

BY

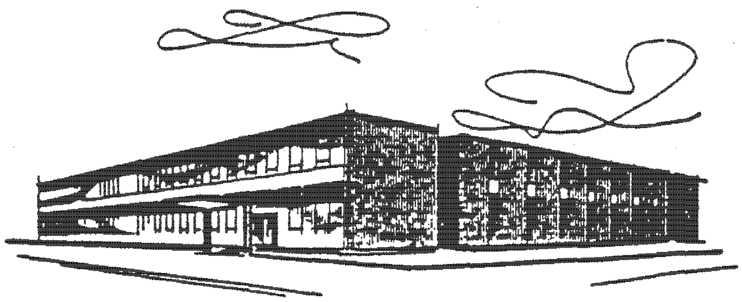
P.G. ALBERT

Tb.No.270T151
TC6F-30"LSB
2400 psig,1000/1000F,1.66/2.24/2.99"Hg ABS

820,000 KW
3600 RPM

DF87STG05 | Class III | February 26,1988

GENERAL ELECTRIC



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AUTHOR	SUBJECT	
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SUMMARY

This report presents the results obtained from a full scale ASME performance test conducted on the IPP unit #2. The results show that:

- The turbine test heat rate at the guarantee load of 820,000 KW, rated conditions of 2400 psig/1000F/1000F, 1.66/2.24/2.99" Hg, and the contract cycle conditions is 7793.0 BTU/KW-HR, which is 0.3% better than guarantee. This excellent performance is consistent over the load range.

- The maximum contract cycle generator output corrected to rated conditions is 872,781 KW, which exceeds the valves wide open output by 2.5%.

- The maximum test throttle flow at rated throttle steam conditions is 6,271,150 lb./hr., which is greater than the valves wide open throttle flow by 2.4%.

KEY WORDS
ASME test, full scale test, performance test, efficiency, Intermountain Power Project, IPP #2.

INFORMATION PREPARED FOR Steam Turbine-Generator Engrg. & Manufacturing Operations

TESTS MADE BY Intermountain Power Project and General Electric Company

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I. INTRODUCTION

A full scale ASME performance test was run on the IPP #2 unit to determine the overall performance of the turbine relative to its guarantee. The tests were conducted through the cooperative efforts of General Electric Company and Intermountain Power Project.

The turbine-generator unit was intially synchronized in February 1987. Enthalpy drop efficiency tests were run on the high pressure (HP) and intermediate pressure (IP) turbines after startup to establish the efficiency levels for these components. The establishment of the startup performance level as soon as possible after initial synchronization is a necessary prerequisite to the running of an ASME full-scale acceptance test. This step provides the basis for identifying the presence of performance deviations which may occur in the time period before a full-scale test can be run.

In May of 1987, the full-scale ASME performance test was conducted. The initial test point was performed for the primary purpose of instrument checkout, data taker training, isolation verification, and determining the efficiency of the HP and IP turbine sections. This data showed the HP turbine efficiency to have deteriorated 1.4% since startup and the IP turbine efficiency to have deteriorated 0.2%. Despite this deterioration, the performance test was conducted as originally planned. A series of nine full-scale ASME test points were then conducted from May 11 through May 16, 1987. This report presents the results of the full-scale performance test as well as the startup enthalpy drop test.

II. INSTRUMENTATION

The instrumentation and measurements required for a full scale test are described in detail in PTC-6 1976. A brief summary of the application of PTC-6 to the IPP #2 unit follows:

A. Description of Unit

The turbine is a tandem compound 3600 RPM design with a single flow HP turbine, a double flow IP turbine, and a six flow low pressure turbine with 30" last stage buckets. It is a single reheat design with rated steam conditions of 2400 psig/1000F/1000F and a nameplate rating of 820,000 KW at 1.66/2.24/2.99" HgA exhaust pressure. A cross-section of the HP turbine is given in Figure 1A, the IP turbine is shown in Figure 1B, and one of the three low pressure sections is shown in Figure 1C.

A schematic of the the turbine and feedwater cycle is given in Figure 2. The locations and types of measurements which were made are identified on this figure.

B. Pressures, Temperatures, Flows

Most of the instrumentation for the test was provided by the General Electric Company. Temperatures were measured using calibrated chromel constantan thermocouples with continuous leads from the hot junction to an electronic (real ice) ice bath. Per PTC-6 recommendations, temperatures which have the most influence on the test results were measured at two different points, close together, and the mean of the readings was considered to be the temperature of the fluid.

Transducers were used for the measuring the various pressures as well as the differential pressures across numerous flow elements. Many pressures were multiplexed to one transducer through the use of scanivalves. This justified the use of expensive, ultra high accuracy Ruska quartz bourdon tube transducers. Rosemount and Gemac transducers were used to measure differential pressures on secondary flow elements and

Heise pressure transducers were used for some static pressure measurements. Prior to the start of the test, an in-place calibration of transducers was performed.

The condensate flow to the deaerator was measured using an ASME primary-flow section which had a throat tap nozzle with a Beta ratio of 0.423 and a throat diameter of 9.842". Calibration of this flow section was completed by Alden Research Laboratory (ARL Report No. 112-84/C354) and the results are show in Figure 3. This flow section, which is the property of IPP, was inspected by IPP personnel a number of weeks prior to the test and found to be clean and undamaged. After completion of the test, GE recommended that the nozzle be inspected to verify that the nozzle remained clean during the test. However, the outage schedule never permitted inspection of this nozzle soon after the test. The differential pressure across the nozzle was measured on both sets of taps with Ruska DDR transducers. The temperature-controlled quartz bourdon tube transducers have an accuracy of 0.02% of reading plus 0.02% of full scale.

A calibrated flow section having a throat tap nozzle with a Beta ratio of 0.45 was used to measure the extraction steam flow to each of the two boiler feed pump turbines. The main steam attemperation spray flow was measured with a station pipe tap nozzle which was inspected by IPP prior to the test using the inspection port. A station orifice was used to measure the combustion gas reheat return to the deaerator. The feedpump injection flows where measured with six station orifices, one for each of the two main boiler feedpumps, one for the startup boiler feedpump, and one for each of the three booster boiler feedpumps. The feedpump seal return flows were measured with two calibrated turbine-meter flow sections which were provided by GE. Numerous flows in the steam seal system (see Figure 4) were measured with station orifices and forward-reverse tubes. No reheat attemperation spray flow or air preheat flow was used during the test.

C. Electrical Measurement

The generator electric load measurements were obtained using the following apparatus:

Electrical Apparatus Used	Serial No.	Phase
Current Transformers (customer's property)		
Potential Transformers (GE Property)	G425553	A
Type: JVS-150	G414871	B
Rating: 13800/120, 3000 VA, 60 Hz	K135196	C
Instruments (GE Property)	30809740	A
Precision Watthour Meters	30809742	B
Type: IBL-10 (Modified)	30809743	C
Rating: 2.5 Amp, 120 Volt, 60 Hz		

The precision watthour meters and the associated readout equipment were used to determine generator output of each of the three phases. These instruments were supplied by the General Electric Company along with a test cabinet for making all necessary electrical connections. The measuring setup was located in the control room.

The precision watthour meters were calibrated in Schenectady at the standards laboratory of Upstate New York Instrumentation Services, General Electric Company. During the calibration and the test, these meters operated in a temperature-controlled cabinet.

The potential transformers were calibrated at the General Electric Somersworth, New Hampshire plant. These calibrations provided the phase angle correction factors and the ratio correction factors for the potential transformers. The secondary burden consisted solely of our instruments. All transformers were grounded at their secondaries. During the testing, steam conditions and throttle flow were held as steady as possible to maintain steady generator load.

During each test, revolutions of the IBL-10 watthour meters were counted by electronic counters. The digital readout of these counters and the timer was photographed or recorded at precise 15-minute intervals. Phase voltages and currents were recorded by the data acquisition system. These values were used to determine the average armature current of each phase, average line-to-line voltage, and the power factor of the unit during each test. The value of generator hydrogen pressure was recorded during each test using the station instrumentation.

D. Data Acquisition

During the ASME performance test, a Hewlett-Packard 1000 data acquisition system was used for collection and reduction of test data. The computer has a 0.5 megabyte core memory with a 64 megabyte disc and is housed in a mobile trailer. For convenience, the mobile trailer was located on the turbine deck for the duration of the test.

Use of the system eliminated the need for about 20 data takers, thereby reducing the testing cost for the customer. In addition, the rate of recording data was increased and thus reducing data scatter uncertainty. Using both pressure multiplexing and computer input multiplexing, the scan time was about 3.7 minutes. The more important variables such as primary flow were read more frequently (once every 28 seconds).

During a test point, the system allowed complete visibility of the data as it was logged and stored on magnetic tape. Upon completion of a test point, a hard copy of the raw data was printed, along with corresponding scan times and averaged values converted to engineering units. The system could also be used to perform heat balance calculations for determining detailed turbine performance results as well as information on the performance of other components of the cycle.

E. Cycle Isolation

For all test points, a number of valves were closed to prevent unaccounted-for flows from entering or leaving the test cycle or bypassing any cycle component. Many lines were isolated by closing two isolation valves and opening a drain between the valves to verify no leakage. For steam line drains to the condenser, the drain line temperature near the condenser was checked to verify that the single isolation valve was not leaking. During the initial test, some drain valves were found to be leaking, but these isolation problems were corrected by closing additional drain line valves.

The No. 1 and No. 2 low pressure heater continuous vents were not isolated to avoid the heater from becoming air bound during a test point. These heater vent leakage flows were estimated to be insignificant to overall performance and no correction was made in the heat balance calculations for this performance loss.

The unaccounted-for flow leaving the cycle was about 0.1% of the valve wide open throttle flow. Some identified sources for this leakage were the deaerator drain and two relief valves from the final feedwater line.

III. CALCULATIONS

Ten test points were run during the period May 9 through May 16, 1987 which covered three valve best point operating conditions: second, third, fourth, or VWO condition. Test point 1 was considered a preliminary test whose main objective was to provide a check on the cycle isolation and instrumentation. Several isolation deficiencies and instrumentation problems were discovered and corrected. Test points 2, 4, 5, 6, 7, 8, and 10 were run with the cycle in the design mode of operation. Test points 3 and 9 were run with the total flow from the heater #2 drain going to the condenser. Test point 8 was run at VWO over pressure. A summary of test conditions for these test points is given in Figure 5.

The test data which was recorded and stored on a magnetic tape during each test point was printed, along with averaged values converted to engineering units and corrected for water legs, barometric pressure, and instrumentation calibration. The data was then posted on a copy of the instrument diagram (Figure 2) and reviewed for errors, inconsistencies, completeness, etc. An example of a completed posting diagram developed for test point 6 is shown in Figure 6.

The electrical load was calculated from the data obtained from the measurements described in Section II-C by the formula:

Load = Rev. x 60 min./test time (min.) x K x WHMCF x CTRCF x PTRCF x CTMR x PTMR

where:

K	=	Watthour Meter Constant
WHMCF	=	Watthour Meter Correction Factor
CTRCF	=	Current Transformer Ratio Correction Factor
PTRCF	=	Potential Transformer Ratio Correction Factor
CTMR	=	Current Transformer Marked Ratio
PTMR	=	Potential Transformer Marked Ratio

These calculations are done for each phase and the sum of them is the total generator load. Generator data for the average armature current of the phases, the average line-to-line voltage, and the hydrogen pressure are listed in Table I. The test generator load and power factor (PF) are listed in Table II. Comparisons were made between the electrical measurements made by General Electric and the readings obtained from the station computer. These results, given in Table III, show computer point TGBPKO to read within 0.1% of the test electrical load equipment and computer point COAXIO read about 0.25% less MW output. The generator losses are shown in Figure 7.

Table I
Generator Data

Test No.	Avg. Armature Current of 3 Phases	Avg. Line-To-Line Voltage	H_2 Pressure Psig
2	19429	25772	64
3	13410	25736	58
4	19505	25743	64
5	17960	25644	61
6	19554	25699	64
7	17428	25634	62
8	20213	25608	63
9	13614	25532	63
10	17818	25618	63

Table II
Generator Load

Test No.	Date	Time	KW	PF
2	5/11/87	14:15 - 16:15	855960	0.987
3	5/13/87	04:30 - 06:30	592031	0.991
4	5/13/87	01:45 - 13:30	859850	0.989
5	5/14/87	03:30 - 05:30	785980	1.000
6	5/14/87	08:30 - 10:30	860755	0.989
7	5/15/87	03:15 - 05:15	775096	1.002
8	5/15/87	08:30 - 10:30	898356	1.002
9	5/16/87	04:15 - 06:15	599736	0.996
10	5/16/87	13:30 - 15:30	789272	0.998

Table III

Test No.	GE Measured (MW)	Station Computer (MW) TGBPKO	% Diff.	Station Computer (MW) COAXIO	%Diff
2	855.960	855.17	-0.09%	853.85	-0.25%
3	592.031	592.19	0.03%	590.85	-0.20%
4	859.850	859.82	0.00%	857.92	-0.22%
5	785.980	785.66	-0.04%	783.30	-0.34%
6	860.755	860.67	-0.01%	858.63	-0.25%
7	775.096	774.50	-0.08%	777.20	0.27%
8	898.356	--	--	--	-
9	599.740	599.12	-0.10%	598.31	-0.24%
10	789.270	787.51	0.03%	786.57	-0.34%

The performance of the test cycle was calculated by supplying the measurements identified on the posting diagram for each test point to a computerized heat balance model of the turbine cycle. A sample calculation can be found in the ASME PTC-6 Appendix A to Test Code for Steam Turbines. All calculations have been performed using ASME steam properities. The computer output for the test cycle calculations is contained in Appendix A. The output for each test point contains detailed turbine performance results as well as information on the heaters, pumps, and other components of the cycle. The information contained in Appendix A for test point 6 is summarized on the test cycle heat balance diagram of Figure 8.

The expansion line end point (ELEP) was calculated by subtracting the appropriate exhaust loss obtained from the curve given in Figure 8A from the measured used energy end point (UEEP). It is noted that the exhaust loss curve shown in Figure 8A is based on data obtained from numerous tests which were conducted on similar turbines with 30" last stage buckets and also from data obtained on laboratory models.

With the test performance characteristics of the turbine established, the contract cycle analysis was then conducted. The contract cycle analysis provides the final results which are used to compare the test performance with the guarantee performance of the turbine. Contract cycle analysis restores the performance of all the cycle components except the turbine to their respective design values while maintaining the test performance characteristics of the turbine. The test characteristics for the turbine and the steam conditions taken from test cycle are:

1. High pressure turbine efficiency
2. Reheat turbine efficiency (UEEP)
3. Packing flows and rotor cooling steam flow
4. Stage flow functions
5. Hot extractions *
6. Throttle flow
7. Throttle pressure
8. Throttle temperature
9. Reheat temperature
10. Exhaust pressure

* Hot extractions refer to the difference between the test extraction enthalpy and the corresponding stage test expansion line enthalpy.

The exhaust loss given by Figure 8A was used in the contract cycle analysis calculations to relate the UEEP and ELEP enthalpies. A method of performing contract cycle calculations is shown in the ASME PTC-6 Appendix A to Test Code for Steam Turbines.

Contract cycle calculations were performed on eight test points which covered the three valve best point operating conditions: second, third, fourth, or VWO conditions. The flows, pressures, enthalpies, output, and heat rate obtained in the contract cycle analysis are shown on the heat balance diagrams of Figures 9A-9H for test points 2,3,4,5,6,7,9, and 10, respectively. Note that the turbine auxilary power requirements of 175 KW's have been accounted for by including them in the fixed losses. The test cycle fixed losses were 4353 KW and the contract cycle fixed losses were 4528 KW. The correction of output and heat rate to design steam conditions is discussed in Section IV-4.

IV. RESULTS

A summary of pertinent results from both the test cycle and the contract cycle analysis follows:

1. HP Turbine Efficiency

The efficiency of the HP turbine was measured * during each test point. The results are plotted on Figure 10 as a function of throttle flow ratio (TFR) which is the ratio of the throttle flow to the valves wide open (VWO) throttle flow. The efficiencies and the TFR have been corrected to rated throttle conditions of 2400 psig/1000F. The efficiencies obtained from the design heat balances are included. For the VWO points (test points 2,4,6, and 8) the test efficiency is 2.0% better than the design VWO heat balance. This is worth an estimated 0.3% in turbine heat rate.

* Appendix D describes the measurement and calculation of HP and IP efficiency.

The efficiency of the HP turbine deteriorated since the initial performance was established at startup. This is shown in Figure 11, which includes the results of the data taken during the enthalpy drop tests and the full-scale tests. The efficiency established at startup was 1.4% better than the full-scale test. This loss of HP efficiency is worth about 0.25% in turbine heat rate. The ratio of the first stage pressure to throttle pressure for a given valve point has also decreased from the initial test obtained at startup. This could indicate a decrease in flow capacity due to a restriction in the first stage or valves, or an increase in leakage flow from the first stage such as cooling steam flow and N2 packing flows.

2. <u>IP Turbine Efficiency</u>

The efficiency of the IP turbine was also measured during each test point. This efficiency is defined from ahead of the combined reheat valves to the LP bowl. The results obtained during the full-scale test are plotted in Figure 12, along with those previously obtained from the enthalpy drop test. The IP turbine efficiency showed about 0.2% deterioration from what was established at startup.

3. <u>Reheat Turbine Efficiency</u>

The reheat turbine efficiency reflects the combined performance of the IP and low pressure sections. It is measured from the initial conditions defined by the pressure just ahead of the Combined Intercept Valves (CIV's) and bowl enthalpy to the endpoint conditions defined at the exit of the low pressure turbine. Unlike the HP and IP efficiencies discussed above, reheat efficiency can only be determined by performing a full-scale test since a heat balance around the entire turbine in required to determine the used energy endpoint (UEEP) at the low pressure turbine exhaust. Hence, no data for the reheat efficiency was available from the previous enthalpy drop tests which were run prior to the full-scale test.

The results of the reheat turbine UEEP efficiency are presented in Figure 13. These results have been corrected to 1000F reheat temperature. The level of efficiency indicated by the test curve is equal to the design curve.

Results for the reheat turbine efficiency based on the expansion line endpoint (ELEP) are shown in Figure 14. The annulus velocity used to calculate and plot the ELEP efficiency was based on the three exhaust pressures obtained in each of the three hoods rather than the combined average exhaust pressure for all three hoods. For each test point, the exhaust loss was determined for each of the three hoods and the average exhaust loss was then used to calculate the ELEP efficiency. The test level of performance is better than the design level of performance.

4. Output and Heat Rate

A. Test Cycle

The test value of the major variables which affect turbine and cycle performance are shown in Appendix C along with the test cycle results for output and heat rate. This data has been used in conjunction with the correction curves for throttle pressures, throttle temperature, reheat temperature and exhaust pressure, which are given in Appendix B, to obtain values for the test output and heat rate corresponding to the rated conditions of 2400 psig, 1000/1000F, 1.66/2.24/2.99 HgA, 0.9 power factor, and H_2 pressure of 63 psig. The final values for test output and heat rate at rated conditions have been plotted in the form of test heat rate versus test load in Figure 15. The design curve shown is based on the design heat balances which include 1% cycle makeup and a heat rate definition with heat input by the condensate pump and for 0.1% boiler blowdown flow.

B. Contract Cycle

As noted earlier in Section III, the results of the contract cycle analysis provided the test turbine performance with all other components in the cycle performing at their respective design performance levels. The contract cycle analysis provides the results for turbine output and heat rate which are used to compare the test performance with guarantee. Table IV contains a summary of the contract cycle results for output and heat rate. Both have been corrected to rated conditions using the same correction factors listed in Appendix C. The corrected data is plotted in Figure 16 which also contains the design heat rate curve.

The contract cycle test heat rate was compared to the guarantee value using the method outlined in the turbine-generator contract. First, the equation for the straight line between the design heat balance heat rates at the third valve point and valves wide open was determined. Second, the difference between the heat rate at 820,000 KW from the straight line equation and the specified contract 820,000 KW guaranteed heat rate was calculated to be 6.9BTU/KW-HR. Third, the test heat rate at 820,000 KW was calculated from a straight line equation between the test heat rates at the third valve point and the valves wide open. The resultant corrected test heat rate at 820,000 KW was then determined by subtracting the 6.9 BTU/KW-HR obtained in step 2 from the straight line interpolation of the test heat rate obtained in step 3. This corrected test heat rate is 7793.0 BTU/KW-HR and guarantee value is 7816 BTU/KW-HR (See the guarantee heat balance 481HB111 shown in Figure 17A). The test value is better than guarantee by 23.0 BTU/KW-HR or 0.3%. The test heat rate is considerably better than the design level over the entire tested load range. This difference is primarily attributed to the better stage performance of all turbine sections relative to design.

Using the startup levels of HP and IP efficiency, the corrected contract cycle heat rates would have been 0.55% better than guarantee.

The VWO test output of 872781 KW (Average of test points 2,4, and 6) exceeds the guarantee value of 820,000 KW by 6.4% and design VWO value by 2.5%. The measured VWO throttle flow corrected to 2400 psig/1000F is 6,271,150 LB/HR (average of test points 2,4, and 6) which exceeds the design VWO throttle of 6,122,730 LB/HR by 2.4%.

Table IV

Summary - Contract Cycle Analysis
Generator Output

Test Point	Contract Cycle * Output	Contract Cycle Output** Corrected to Rated Conditions
2	843805 KW	874951 KW
3	586602 KW	602734 KW
4	847509 KW	872168 KW
5	775180 KW	795887 KW
6	848153 KW	871223 KW
7	763183 KW	788467 KW
9	593082 KW	594212 KW
10	777947 KW	794286 KW

Heat Rate

Test Point	Contract Cycle * Heat Rate	Contract Cycle Heat Rate** Corrected to Rated Conditions
2	7958.9	7767.2
3	8084.6	7916.5
4	7984.9	7791.4
5	7977.7	7812.4
6	7951.3	7777.4
7	7996.9	7811.6
9	7872.3	7928.7
10	7897.2	7808.4

* Calculated for the test conditions of throttle pressure and temperature, reheat temperature, and exhaust pressure. The power factor and hydrogen pressure were 0.90 and 63 psig, respectively. Makeup of 1.0%.

** The corrections used for throttle pressure, throttle temperature, reheat temperature, and exhaust pressure are listed in Appendix C.

5. Stage Flow Functions

The flow function for a stage is defined by the relationship:

$$\text{Stage Flow Function} = Q/(A\sqrt{P/v})$$

where:

- Q = Flow to the following areas
- A = Stage nozzle area
- P = Stage shell pressure
- v = Specific volume at the stage shell pressure and temperature

The flow function should have a constant value which is usually independent of load. Plots of this function will reflect any errors that may exist in the measurement of flow, pressure, or temperature at a specified point in the cycle. Its consistency is a measure of the precision of the test.

Plots of the flow functions calculated for those locations in the turbine where pressures and temperatures were measured (see Figure 2) are given in Figures 19-28. Generally, the values from each test point line up very well for each respective location demonstrating good consistency and, therefore, good precision.

The flow functions obtained for the positions in the HP turbine (Figures 19 and 20) exhibit a positive slope with flow to the following stage (i.e., load). This relationship is common to other large single-flow fossil, high pressure turbines. The remaining plots contain the results for locations in the IP and LP turbines. The first stage pressure has been plotted versus throttle flow in Figure 18.

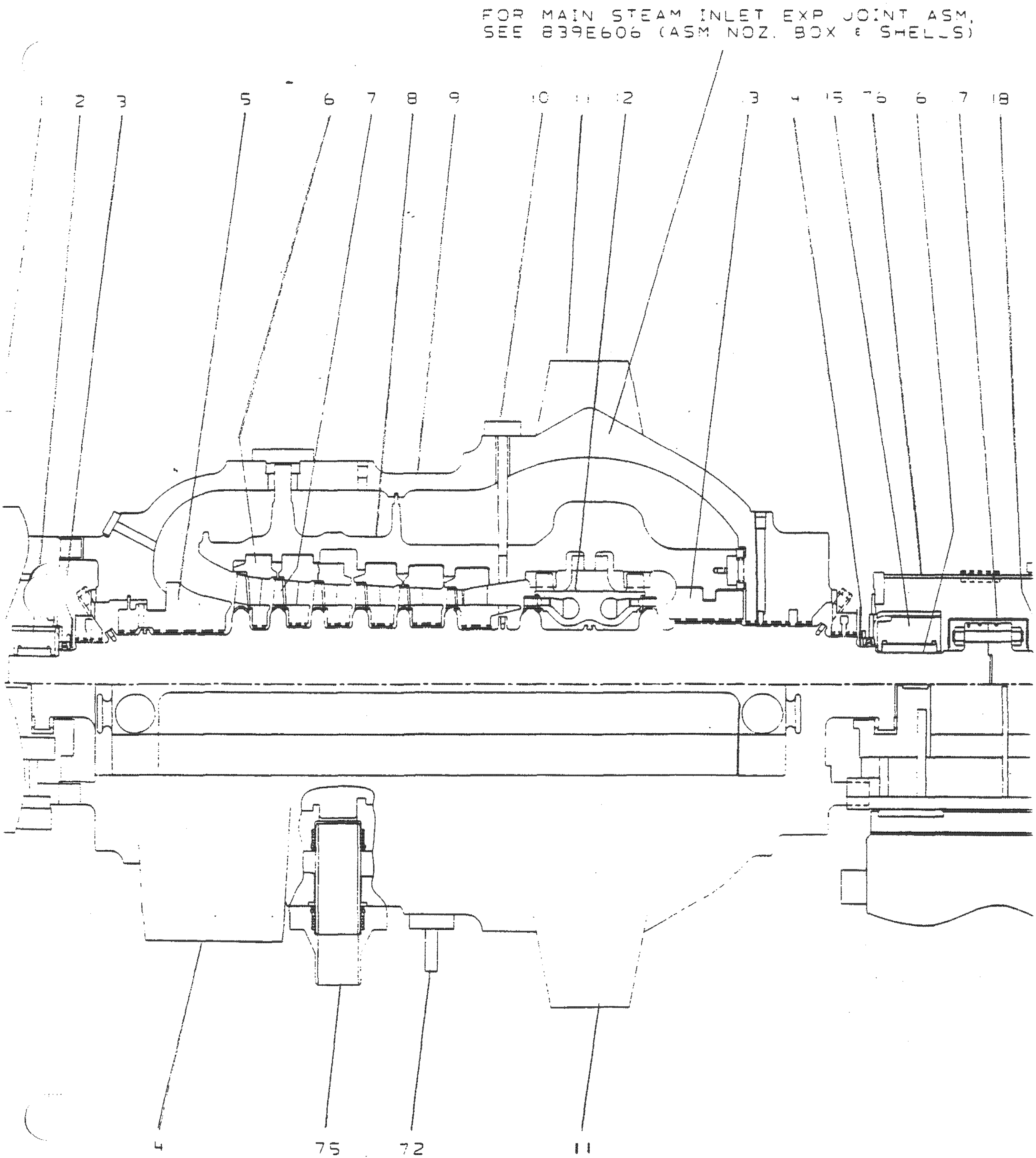
6. Packing Flows

The turbine shaft packing flows were measured (see Figure 2) during the ASME performance test. The more significant flows are plotted in Figures 29-34. The HP turbine high pressure packing flows are plotted versus throttle flow in Figures 29 and 30 while the low pressure packing leakoff flows are shown in Figures 31 and 32. The IP turbine shaft packing flows to the steam seal header are shown in Figures 33 and 34.

The packing flow constants determined from these test results have been used in the contract cycle calculation. However, packing flows have only a small effect on heat rate.

V. CONCLUSION

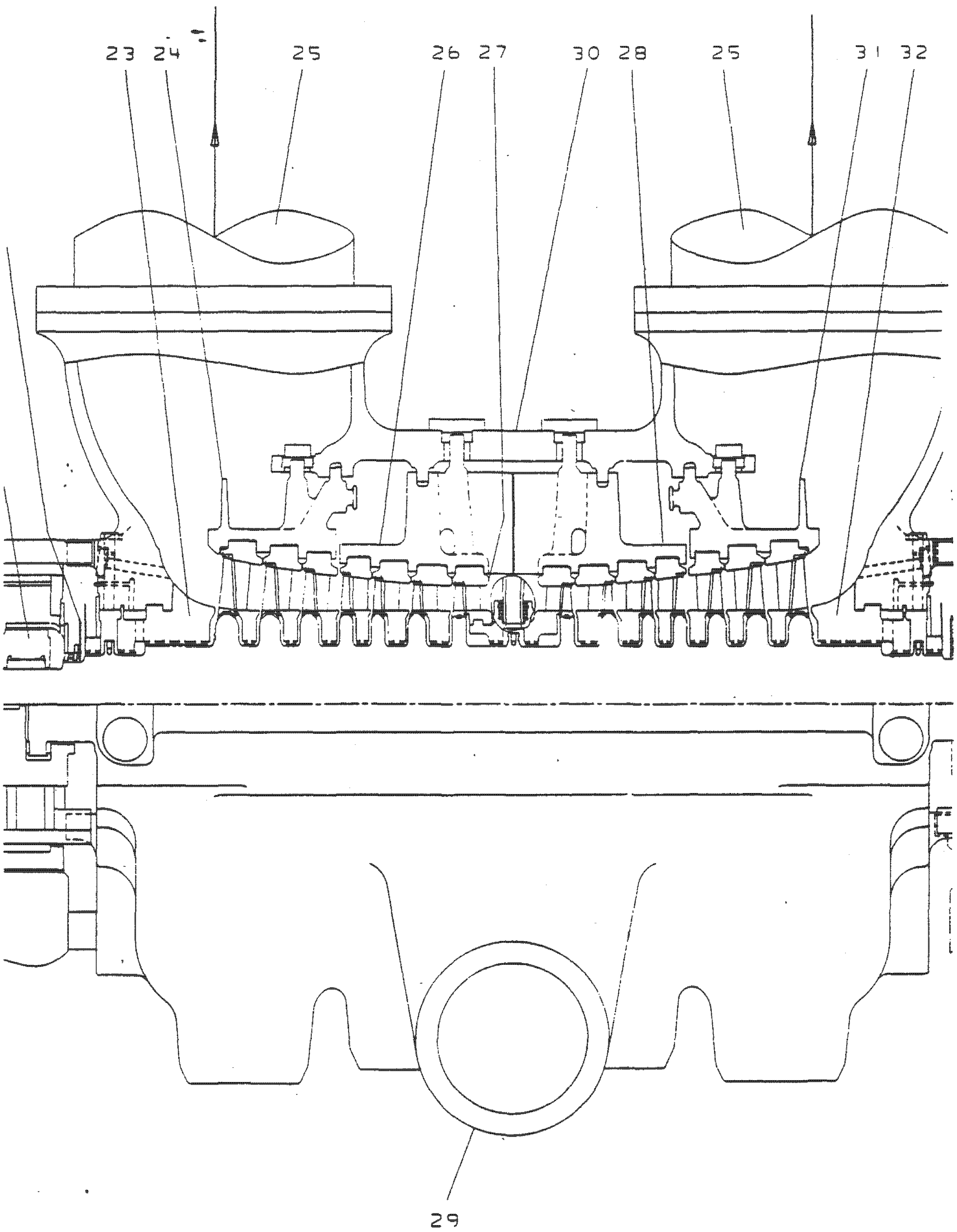
The IPP #2 turbine-generator unit is 23.0 BTU/KW-HR or 0.3% better than guarantee at the guarantee output of 820,000 KW. The performance level of the unit is considerably better than design over the entire load range. The maximum contract cycle KW output at rated conditions is 872,781 KW. This exceeds the design VWO value of 851,733 KW by 2.5%. The maximum test throttle flow at rated steam conditions is 6,271,150 lb/hr., which is greater than the valves wide open (VWO) throttle flow of 6,122,730 lb/hr by 2.4%. The HP turbine section efficiency is 2.0% better than design at VWO, while at startup, it was 3.4% better than design. The reheat turbine efficiency, which reflects the combined performance of the IP and low pressure turbine sections, is on the average 0.2% better than design when corrected to rated reheat temperature.



INTERMOUNTAIN POWER PROJECT
UNIT # 2
HIGH PRESSURE SECTION

FIG. 1A

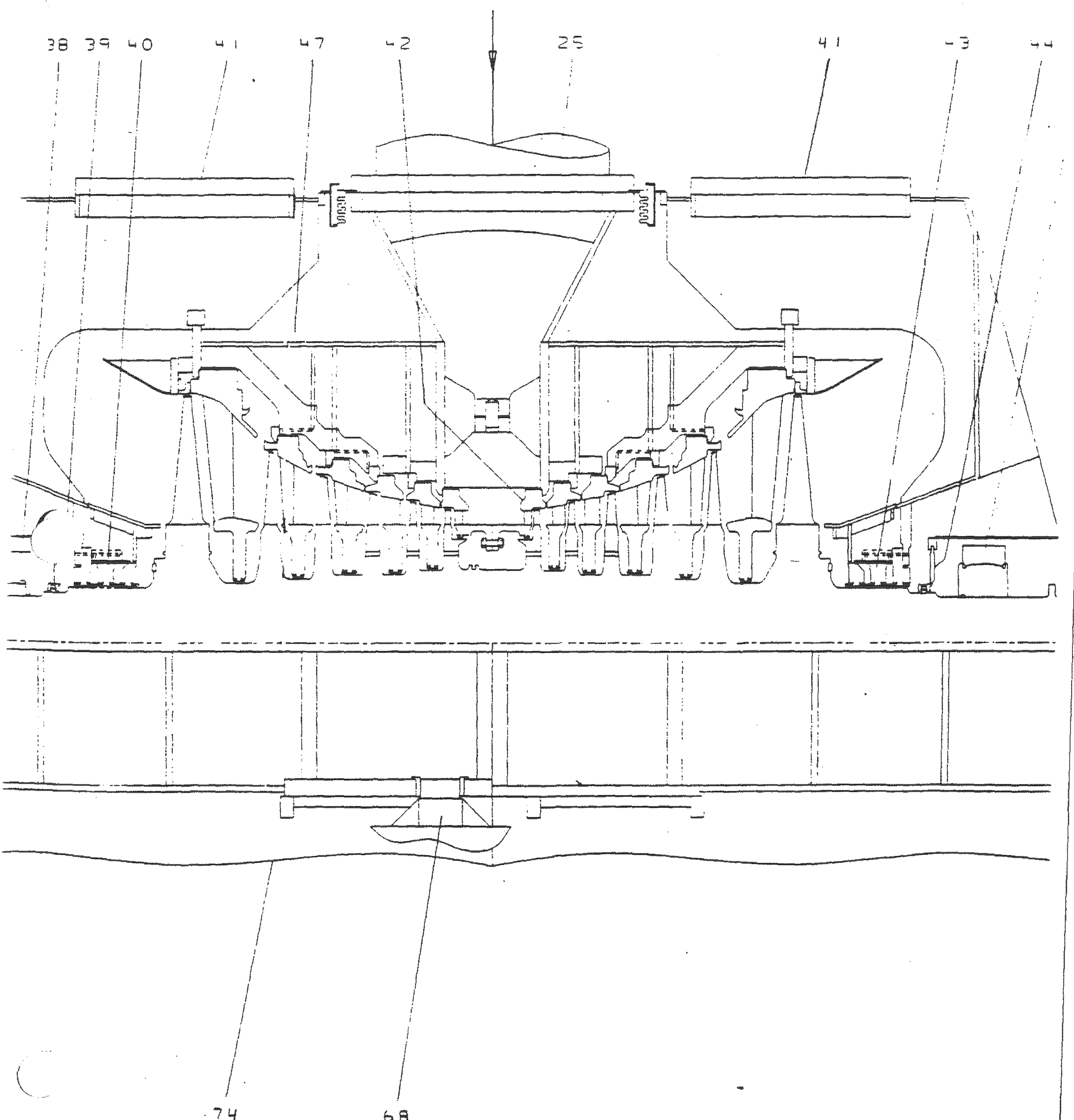
IP14_005043



INTERMOUNTAIN POWER PROJECT
UNIT # 2
INTERMEDIATE PRESSURE SECTION

FIG. 1B

IP14_005044



INTERMOUNTAIN POWER PROJECT
UNIT # 2
LOW PRESSURE SECTION
HOOD "A" DUPLICATE OF "B" AND "C"

FIG. 1C

IP14_005045

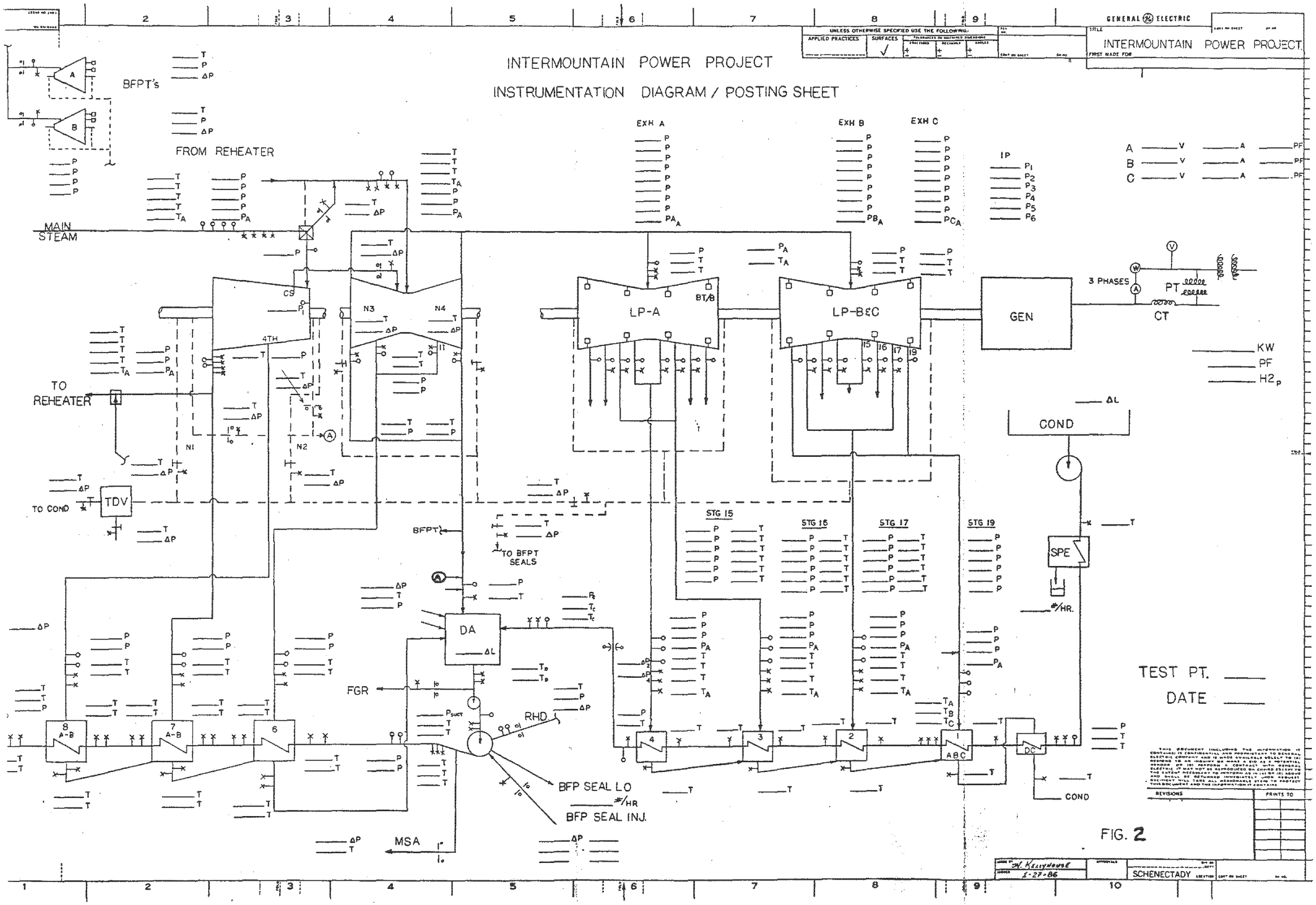

INTERMOUNTAIN POWER PROJECT
INSTRUMENTATION DIAGRAM / POSTING SHEET
GENERAL ELECTRIC
INTERMOUNTAIN POWER PROJECT
BFPT's
FROM REHEATER
MAIN STEAM
TO REHEATER
TO COND
TDV
CS
4TH
N1
N2
N3
N4
EXH A
EXH B
EXH C
IP
LP-A
LP-B&C
GEN
3 PHASES
PT
CT
KW
PF
$H2_p$
COND
SPE
#/HR.
BFPT
TO BFPT SEALS
DA
FGR
RHD
BFP SEAL LO
BFP SEAL INJ.
MSA
STG 15
STG 16
STG 17
STG 19
DC
TEST PT.
DATE
SCHENECTADY
1-27-86

FIG. 2

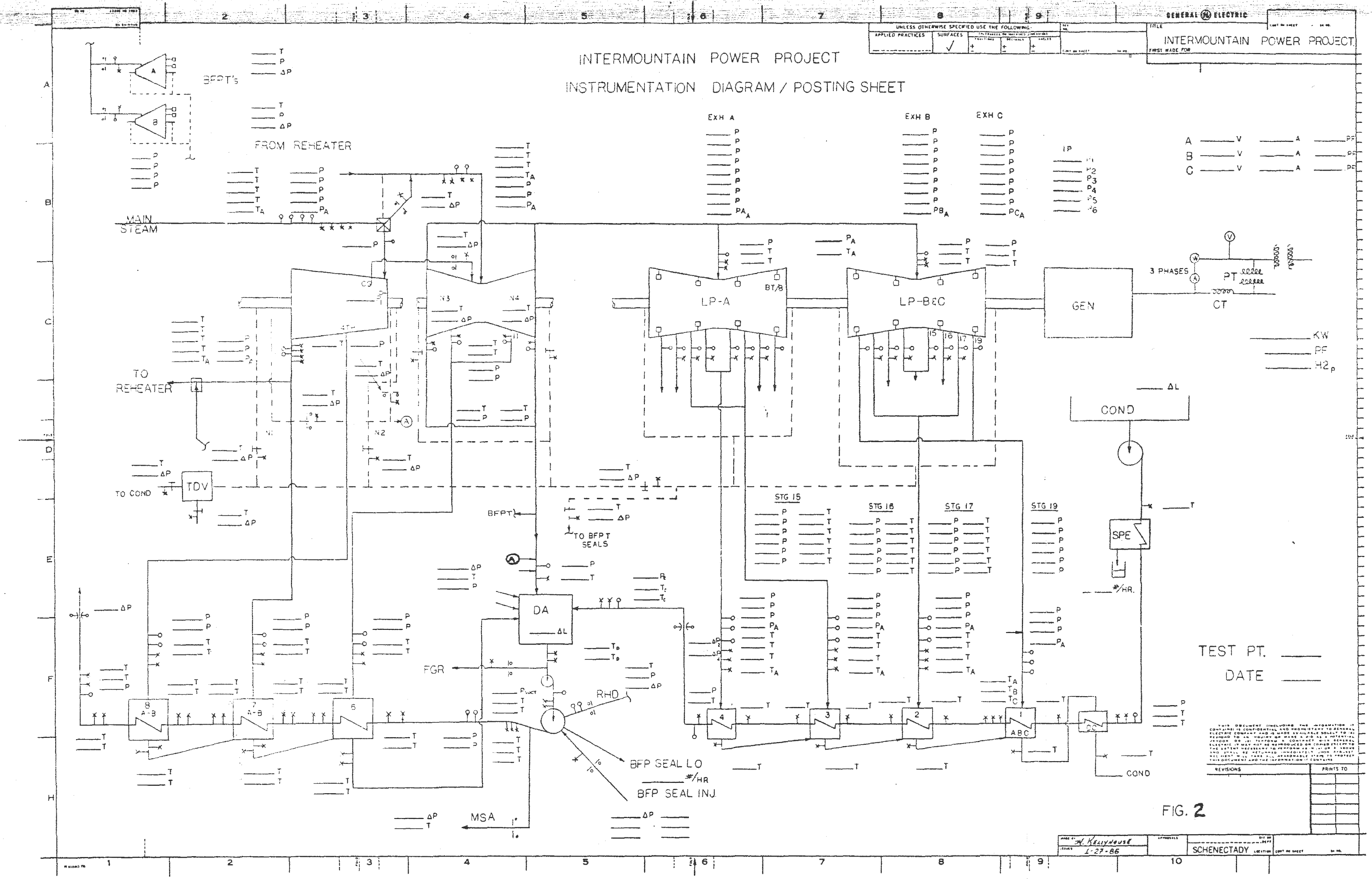


FIG. 2

IP14_005047

INTERMOUNTAIN POWER CO.

IPP No. 2

Condensate Flow Nozzle Calibration

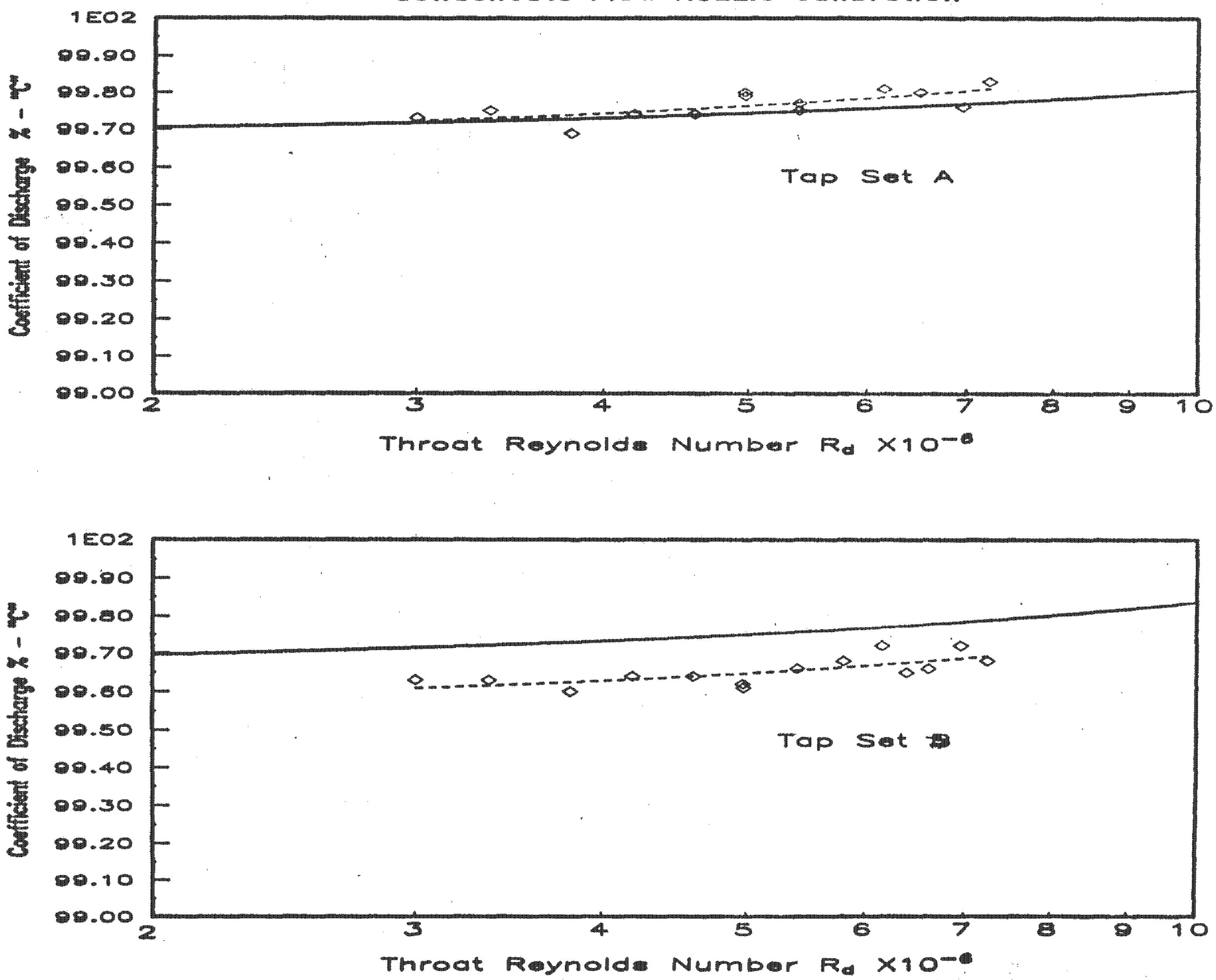
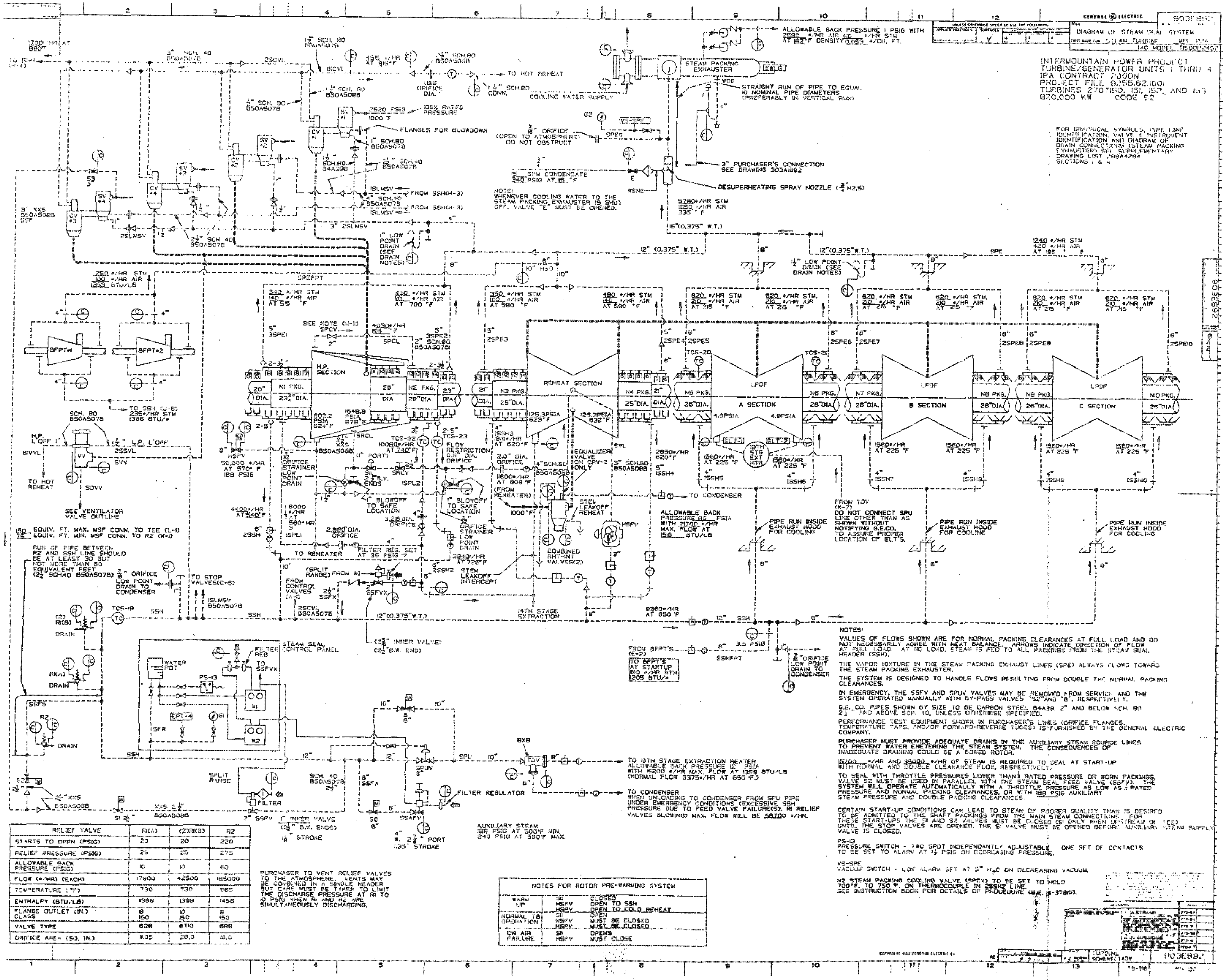


Figure 3

FIG. 3



INTERMOUNTAIN POWER PROJECT
TURBINE/GENERATOR UNITS 1 THRU 4
IPA CONTRACT 2000N
PROJECT FILE 9255.62.1001
TURBINES 270T150, 151, 152, AND 153
870,000 KW CODE S2

FOR GRAPHICAL SYMBOLS, PIPE LINE IDENTIFICATION, VALVE & INSTRUMENT IDENTIFICATION AND DIAGRAM OF DRAIN CONNECTIONS (STEAM PACKING EXHAUSTER) SEE SUPPLEMENTARY DRAWING LIST 298A4284 SECTIONS 1 & 4

NOTES:

VALUES OF FLOWS SHOWN ARE FOR NORMAL PACKING CLEARANCES AT FULL LOAD AND DO NOT NECESSARILY AGREE WITH HEAT BALANCE. ARROWS INDICATE DIRECTION OF FLOW AT FULL LOAD. AT NO LOAD, STEAM IS FED TO ALL PACKINGS FROM THE STEAM SEAL HEADER (SSH).

THE VAPOR MIXTURE IN THE STEAM PACKING EXHAUST LINES (SPE) ALWAYS FLOWS TOWARD THE STEAM PACKING EXHAUSTER.

THE SYSTEM IS DESIGNED TO HANDLE FLOWS RESULTING FROM DOUBLE THE NORMAL PACKING CLEARANCES.

IN EMERGENCY, THE SSFV AND SPUV VALVES MAY BE REMOVED FROM SERVICE AND THE SYSTEM OPERATED MANUALLY WITH BY-PASS VALVES "S2" AND "8", RESPECTIVELY.

G.E. CO. PIPES SHOWN BY SIZE TO BE CARBON STEEL 84A39. 2" AND BELOW SCH. 80 2½" AND ABOVE SCH. 40, UNLESS OTHERWISE SPECIFIED.

PERFORMANCE TEST EQUIPMENT SHOWN IN PURCHASER'S LINES (ORIFICE FLANGES, TEMPERATURE TAPS, AND/OR FORWARD-REVERSE TUBES) IS FURNISHED BY THE GENERAL ELECTRIC COMPANY.

PURCHASER MUST PROVIDE ADEQUATE DRAINS IN THE AUXILIARY STEAM SOURCE LINES TO PREVENT WATER ENETERING THE STEAM SYSTEM. THE CONSEQUENCES OF INADEQUATE DRAINING COULD BE A BOWED ROTOR.

15700 #/HR AND 35000 #/HR OF STEAM IS REQUIRED TO SEAL AT START-UP WITH NORMAL AND DOUBLE CLEARANCE FLOW, RESPECTIVELY.

TO SEAL WITH THROTTLE PRESSURES LOWER THAN ½ RATED PRESSURE OR WORN PACKINGS, VALVE S2 MUST BE USED IN PARALLEL WITH THE STEAM SEAL FEED VALVE (SSFV). THE SYSTEM WILL OPERATE AUTOMATICALLY WITH A THROTTLE PRESSURE AS LOW AS ½ RATED PRESSURE AND NORMAL PACKING CLEARANCES, OR WITH 188 PSIG AUXILIARY STEAM PRESSURE AND DOUBLE PACKING CLEARANCES.

CERTAIN START-UP CONDITIONS CAN LEAD TO STEAM OF POORER QUALITY THAN IS DESIRED TO BE ADMITTED TO THE SHAFT PACKINGS FROM THE MAIN STEAM CONNECTIONS. FOR THESE START-UPS THE S1 AND S2 VALVES MUST BE CLOSED (S1 ONLY WHEN UPSTREAM OF TCS) UNTIL THE STOP VALVES ARE OPENED. THE S1 VALVE MUST BE OPENED BEFORE AUXILIARY STEAM SUPPLY VALVE IS CLOSED.

PS-13
PRESSURE SWITCH - TWO SPDT INDEPENDANTLY ADJUSTABLE ONE SET OF CONTACTS TO BE SET TO ALARM AT 1½ PSIG ON DECREASING PRESSURE.

VS-SPE
VACUUM SWITCH - LOW ALARM SET AT 5" H_2O ON DECREASING VACUUM.

N2 STEAM PACKING COOLING VALVE (SPCV) TO BE SET TO HOLD 700°F. TO 750 °F. ON THERMOCOUPLE IN 2SSH2 LINE.
SEE INSTRUCTION BOOK FOR DETAILS OF PROCEDURE (G.E. K-37815).

RELIEF VALVE	R1(A)	(2)R1(B)	R2
STARTS TO OPEN (PSIG)	20	20	220
RELIEF PRESSURE (PSIG)	25	25	275
ALLOWABLE BACK PRESSURE (PSIG)	10	10	60
FLOW (#/HR) (EACH)	17900	42500	185000
TEMPERATURE (°F)	730	730	865
ENTHALPY (BTU/LB)	1398	1398	1456
FLANGE OUTLET (IN.) CLASS	8 150	10 150	8 150
VALVE TYPE	6Q8	8T10	6R8
ORIFICE AREA (SQ. IN.)	11.05	28.0	16.0

PURCHASER TO VENT RELIEF VALVES TO THE ATMOSPHERE. VENTS MAY BE COMBINED IN A SINGLE HEADER BUT CARE MUST BE TAKEN TO LIMIT THE DISCHARGE PRESSURE AT R1 TO 10 PSIG WHEN R1 AND R2 ARE SIMULTANEOUSLY DISCHARGING.

NOTES FOR ROTOR PRE-WARMING SYSTEM

WARM UP	S8 HSFV HSPV	CLOSED OPEN TO SSH OPEN TO COLD REHEAT
NORMAL T8 OPERATION	S8 HSFV HSPV	OPEN MUST BE CLOSED MUST BE CLOSED
ON AIR FAILURE	S8 HSFV	OPENS MUST CLOSE

FIG. 4

IP14_005049

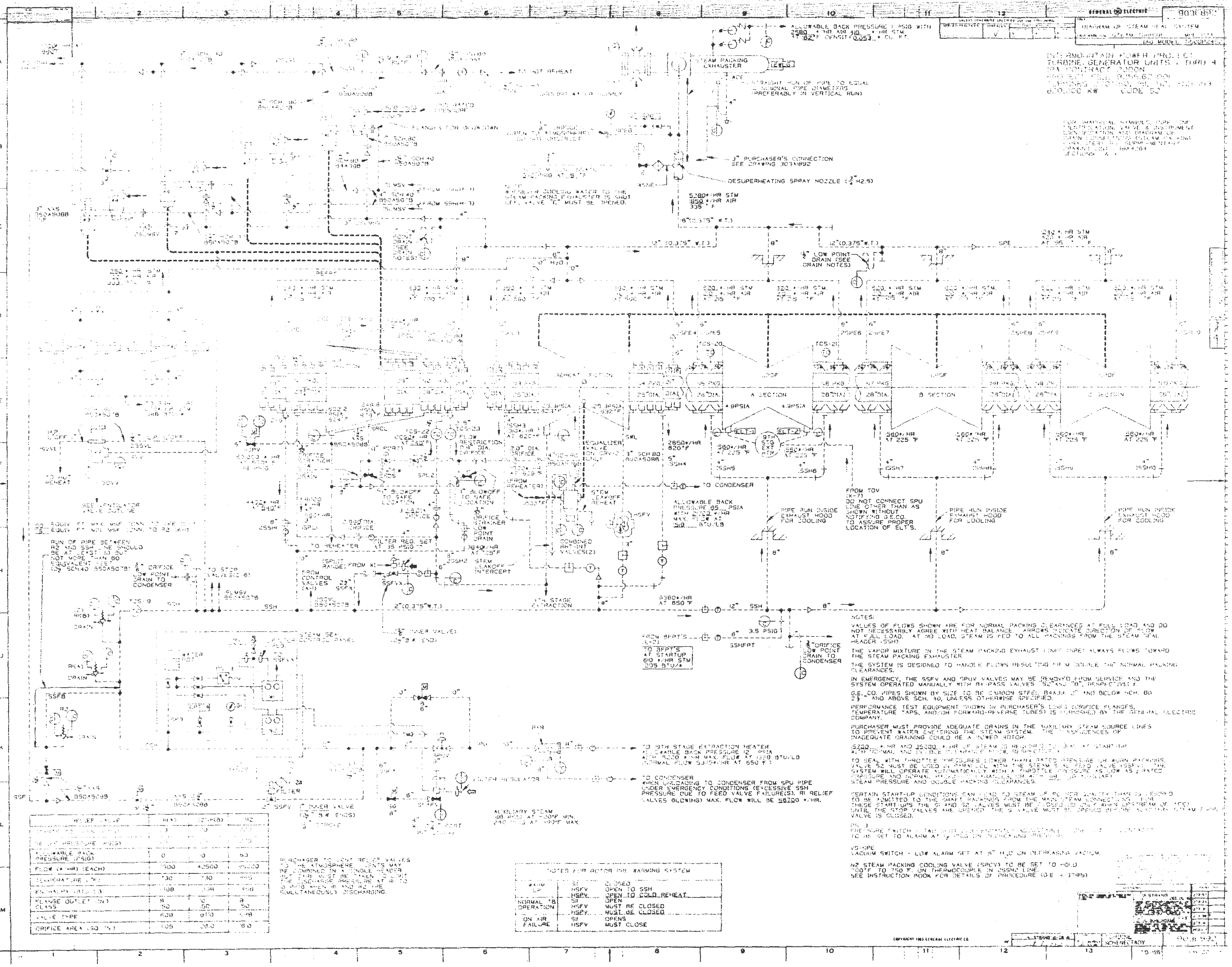


FIG. 4

IP14_005050

SUMMARY OF TEST CONDITIONS

TEST PT.	2	3	4	5	6	7	8	9	10
VALVE PT.	VWO	2nd	VWO	3rd	VWO	3rd	VWO	2nd	3rd
LOAD (MW)	855.96	592.03	859.85	785.98	860.76	775.10	898.36	599.74	789.27
THROTTLE FLOW (LB/HR)	6183909	4056100	6220163	5570279	6224013	5477861	6496919	3978528	5527099
THROTTLE PRESS. (PSIA)	2384.1	2399.8	2394.0	2393.8	2394.2	2388.9	2477.1	2393.3	2382.4
THROTTLE TEMP. (F)	1004.9	1007.2	1000.8	1001.5	996.5	1006.6	988.2	1008.8	1001.7
FIRST STAGE PRESS.	1918.0	1235.5	1926.2	1714.3	1927.3	1689.8	1992.9	1212.3	1698.8
HOT REHEAT PRESS.	521.4	354.0	526.1	475.0	527.6	467.6	544.5	348.7	473.0
HOT REHEAT TEMP.	1000.20	1001.30	1009.20	1006.20	1003.10	1004.30	996.30	1001.60	1007.50
COLD REHEAT PRESS.	566.0	384.3	571.2	514.8	571.5	507.0	590.0	378.4	512.7
COLD REHEAT TEMP.	625.1	566.8	623.0	606.1	619.3	607.3	612.1	565.5	606.5
LP BOWL PRESS.	118.5	81.0	118.9	107.5	118.6	106.1	122.7	79.5	107.5
CROSSOVER TEMP.	617.2	621.2	623.6	622.9	618.8	621.5	612.8	622.1	624.6
LP EXH. PRESS. ("HG)	1.836	1.510	1.871	1.671	1.768	1.725	1.569	1.013	1.452
FINAL FW TEMP.	552.1	508.5	551.9	540.9	551.6	539.1	554.3	506.5	540.7

FIG. 5

Fig. 5

IP14_005051

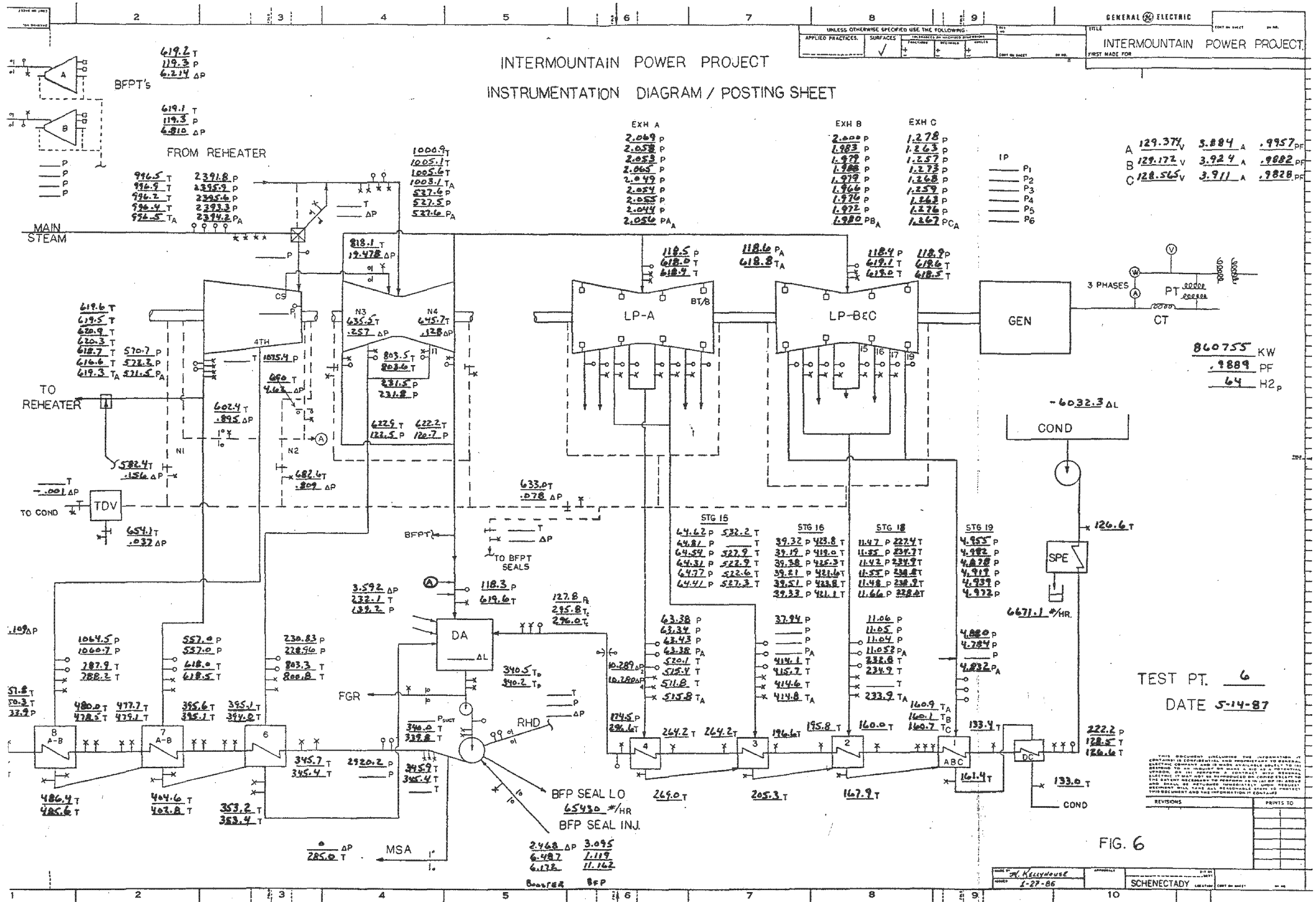
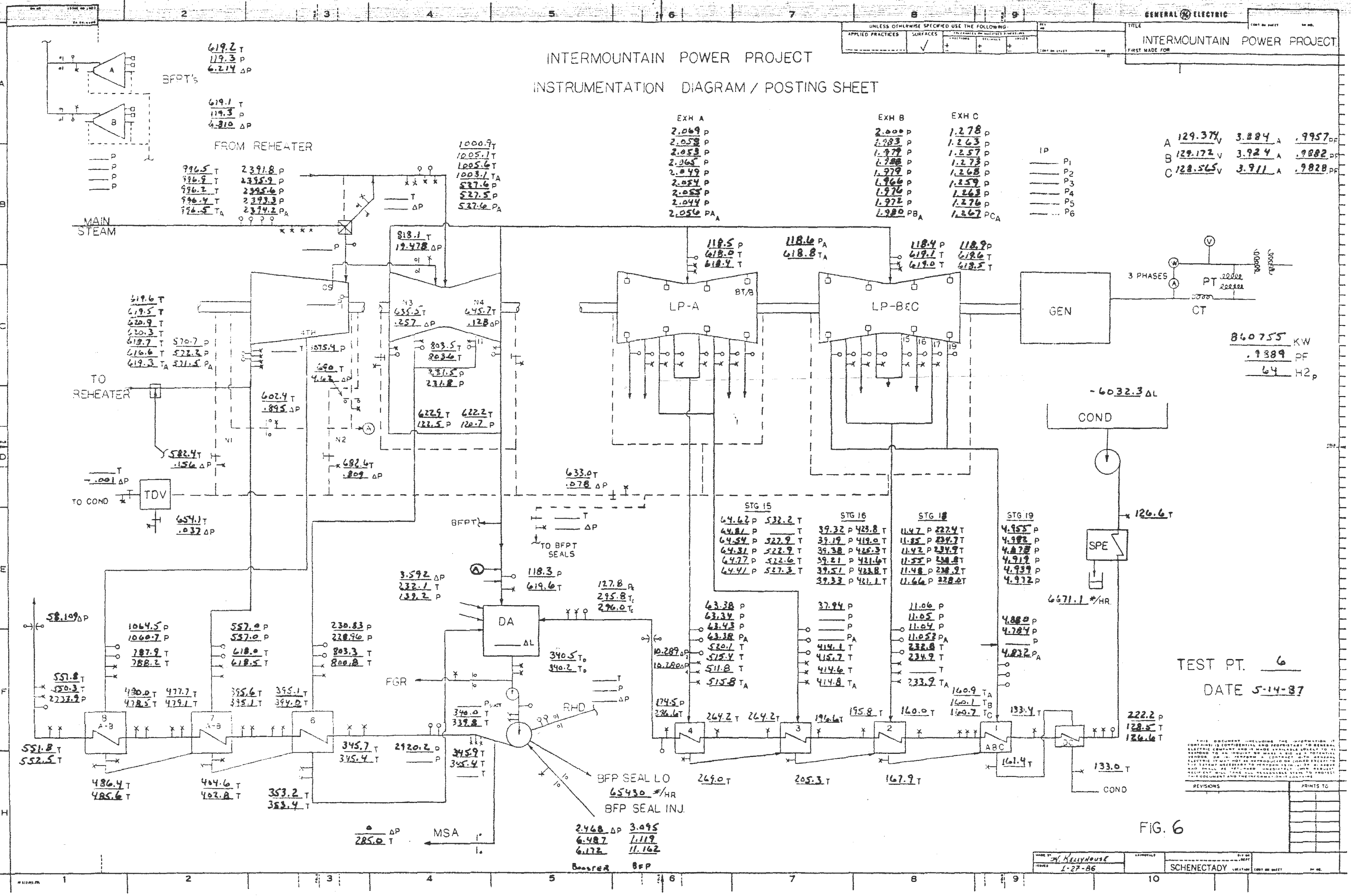


FIG. 6

IP14_005052

INTERMOUNTAIN POWER PROJECT

INSTRUMENTATION DIAGRAM / POSTING SHEET



GENERAL ELECTRIC — INTERMOUNTAIN POWER PROJECT

SCHENECTADY

W. Kellyhouse 1-27-86

IP14_005053

INTERMOUNTAIN POWER CO.

IPP No. 2

Generator Losses

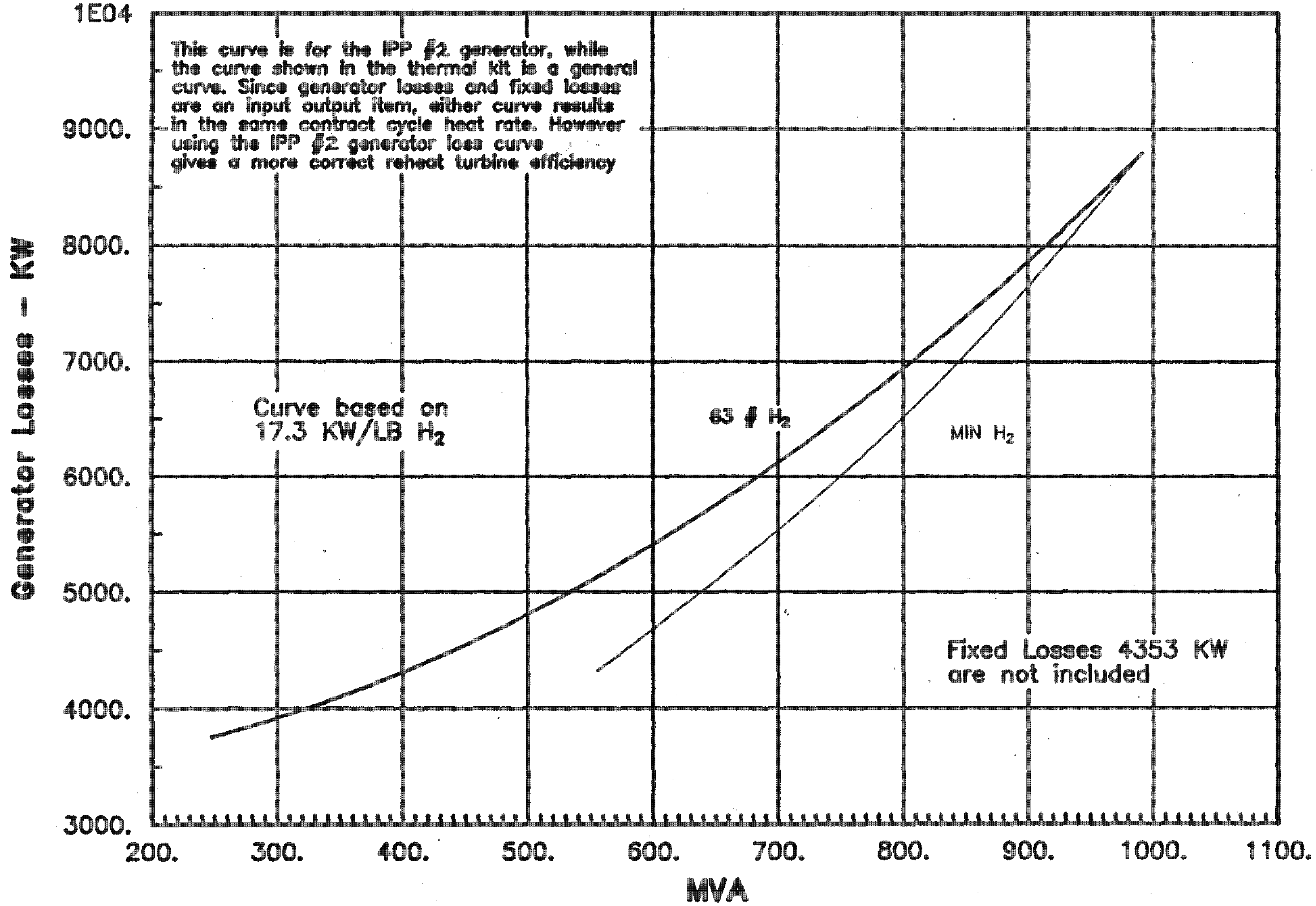


Figure 7

Fig. 7

IP14_005054

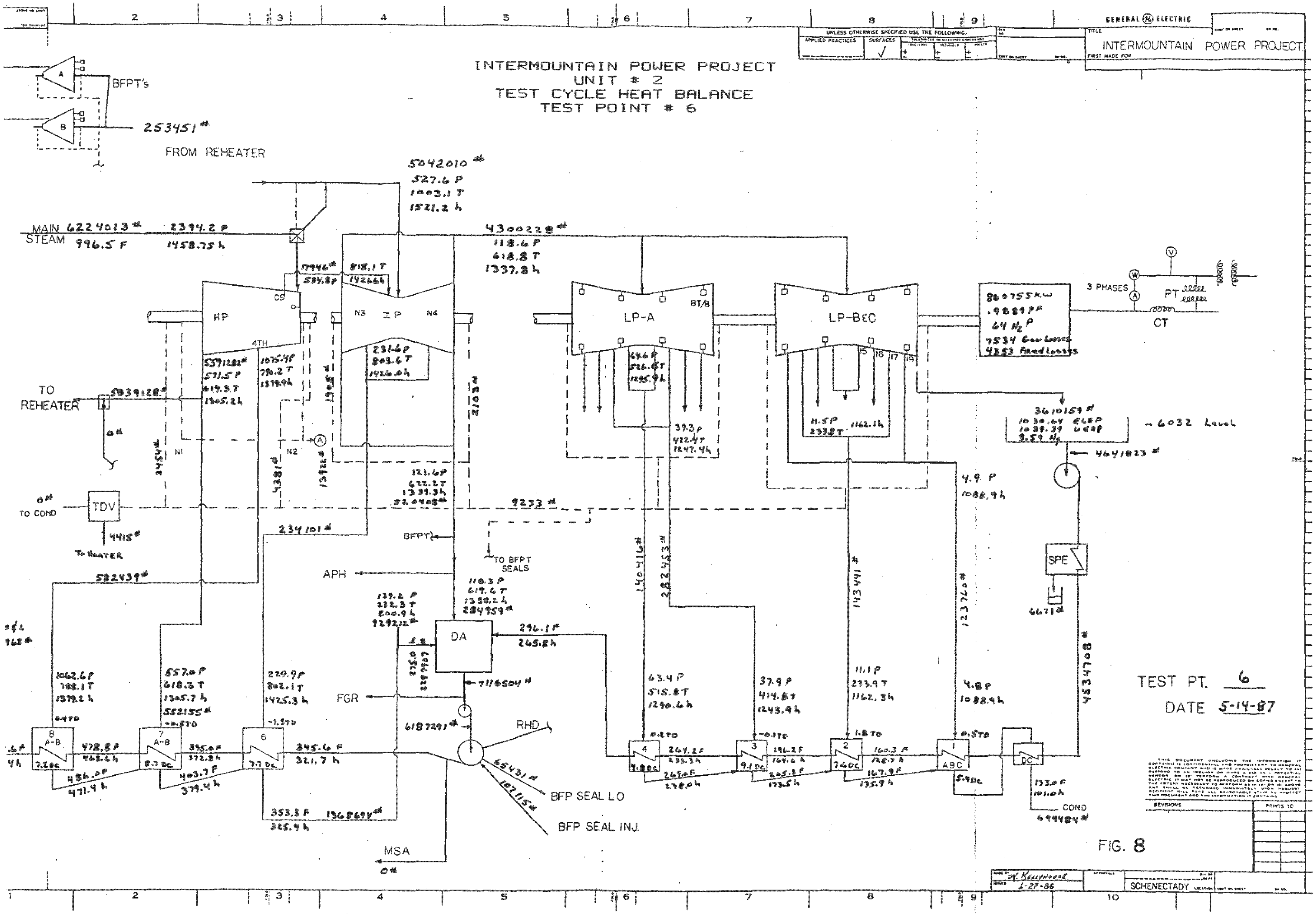
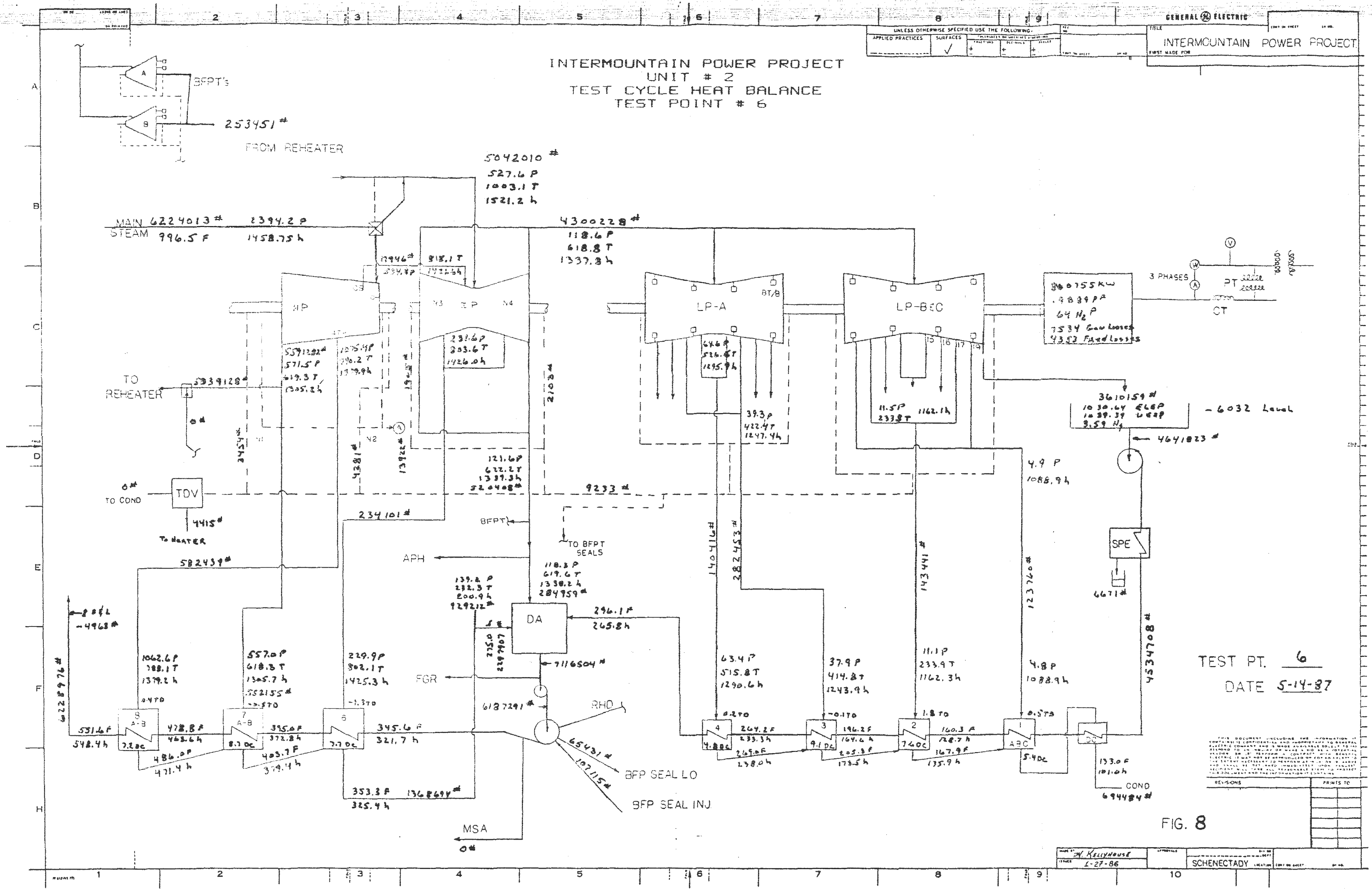

INTERMOUNTAIN POWER PROJECT
UNIT # 2
TEST CYCLE HEAT BALANCE
TEST POINT # 6
GENERAL ELECTRIC
INTERMOUNTAIN POWER PROJECT
BFPT's
253451 #
FROM REHEATER
5042010 #
527.6 P
1003.1 T
1521.2 h
MAIN STEAM 6224013 #
996.5 F
2394.2 P
1458.75 h
4300228 #
118.6 P
618.8 T
1337.8 h
HP
IP
LP-A
LP-B&C
TO REHEATER
5839128 #
TDV
TO COND
4415 #
To Heater
582439 #
234101 #
9233 #
BFPT
TO BFPT SEALS
APH
FGR
DA
296.1 F
265.8 h
7116504 #
6187291 #
RHD
65431 #
107115 #
BFP SEAL LO
BFP SEAL INJ.
MSA
0 #
3 PHASES
PT
CT
860755 kw
.9889 PF
64 H₂ P
7534 Gen Losses
4353 Fixed Losses
36101159 #
- 6032 Level
4641823 #
4.9 P
1088.9 h
SPE
6671 #
4534708 #
DC
133.0 F
101.0 h
COND
6944484 #
TEST PT. 6
DATE 5-14-87
SCHENECTADY
H. Kellyhouse
1-27-86

FIG. 8

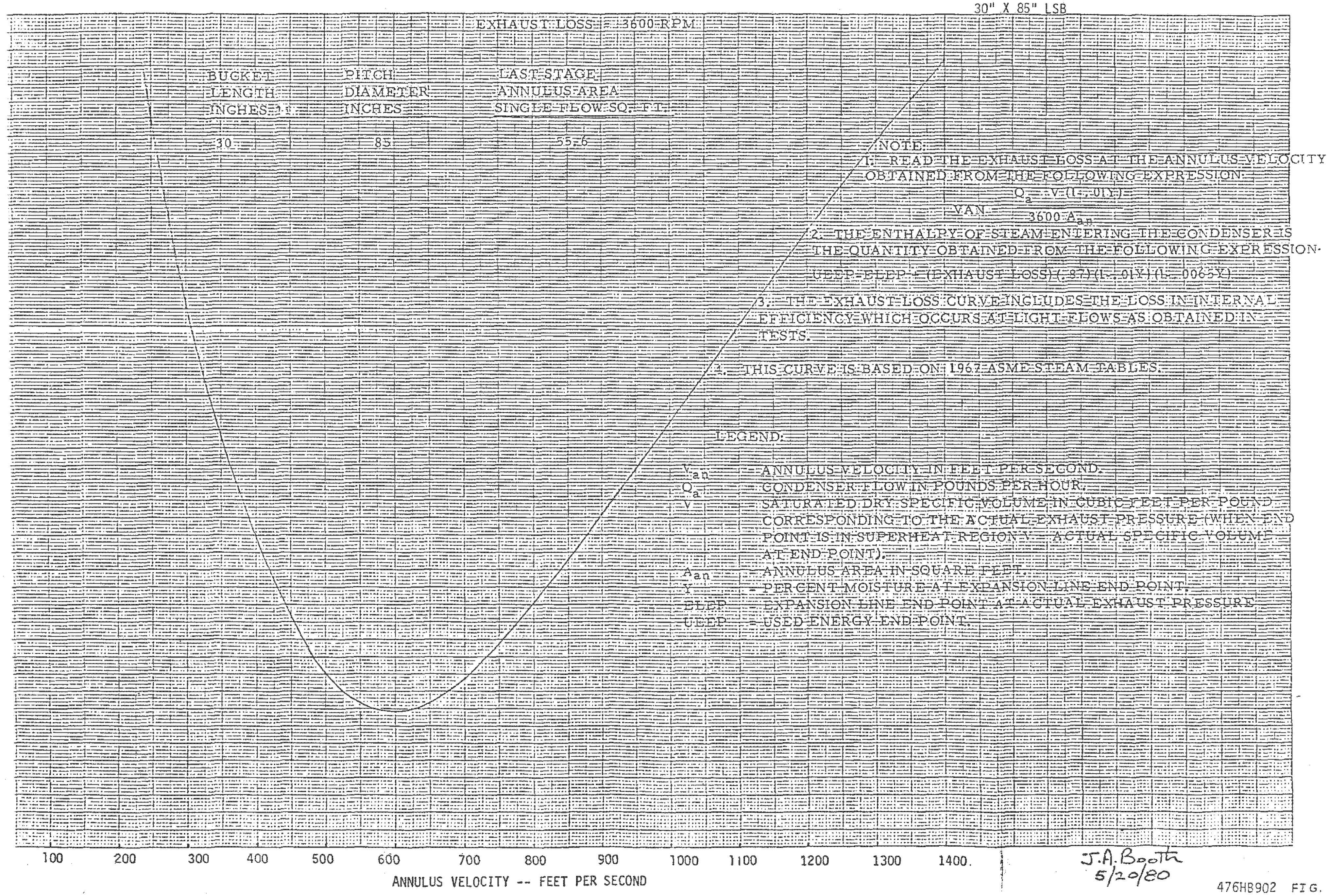


INTERMOUNTAIN POWER PROJECT
UNIT # 2
TEST CYCLE HEAT BALANCE
TEST POINT # 6
GENERAL ELECTRIC
INTERMOUNTAIN POWER PROJECT
BFPT's
253451#
FROM REHEATER
5042010#
527.6 P
1003.1 T
1521.2 h
MAIN STEAM 6224013#
996.5 F
2394.2 P
1458.75 h
4300228#
118.6 P
618.8 T
1337.8 h
HP
IP
LP-A
LP-BEC
TO REHEATER
5339128#
5591282#
571.5 P
619.3 T
1305.2 h
231.6 P
303.6 T
1426.0 h
3 PHASES
PT
CT
TDV
TO COND
4415#
To Heater
582439#
234101#
121.6 P
622.2 T
1337.3 h
9233#
BFPT
TO BFPT SEALS
APH
DA
FGR
RHD
118.3 P
619.6 T
1338.2 h
284959#
296.1 F
265.8 h
7116504#
6187291#
65431#
107115#
BFP SEAL LO
BFP SEAL INJ
MSA
0#
1062.6 P
388.1 T
1379.2 h
557.0 P
618.3 T
1305.7 h
552155#
229.9 P
802.1 T
1425.3 h
531.6 F
548.4 h
478.8 F
463.6 h
395.0 F
372.8 h
345.6 F
321.7 h
486.0 F
471.4 h
403.7 F
379.4 h
353.3 F
325.4 h
1368694#
63.4 P
515.8 T
1290.6 h
37.9 P
414.8 T
1243.9 h
11.1 P
233.9 T
1162.3 h
4.8 P
1088.9 h
4.9 P
1086.9 h
3610159#
4641823#
- 6032 Level
SPE
4534708#
133.0 F
101.0 h
COND
694484#
TEST PT. 6
DATE 5-14-87
FIG. 8
SCHENECTADY
1-27-86

IP14_005056

3902

3600 RPM
30" X 85" LSB



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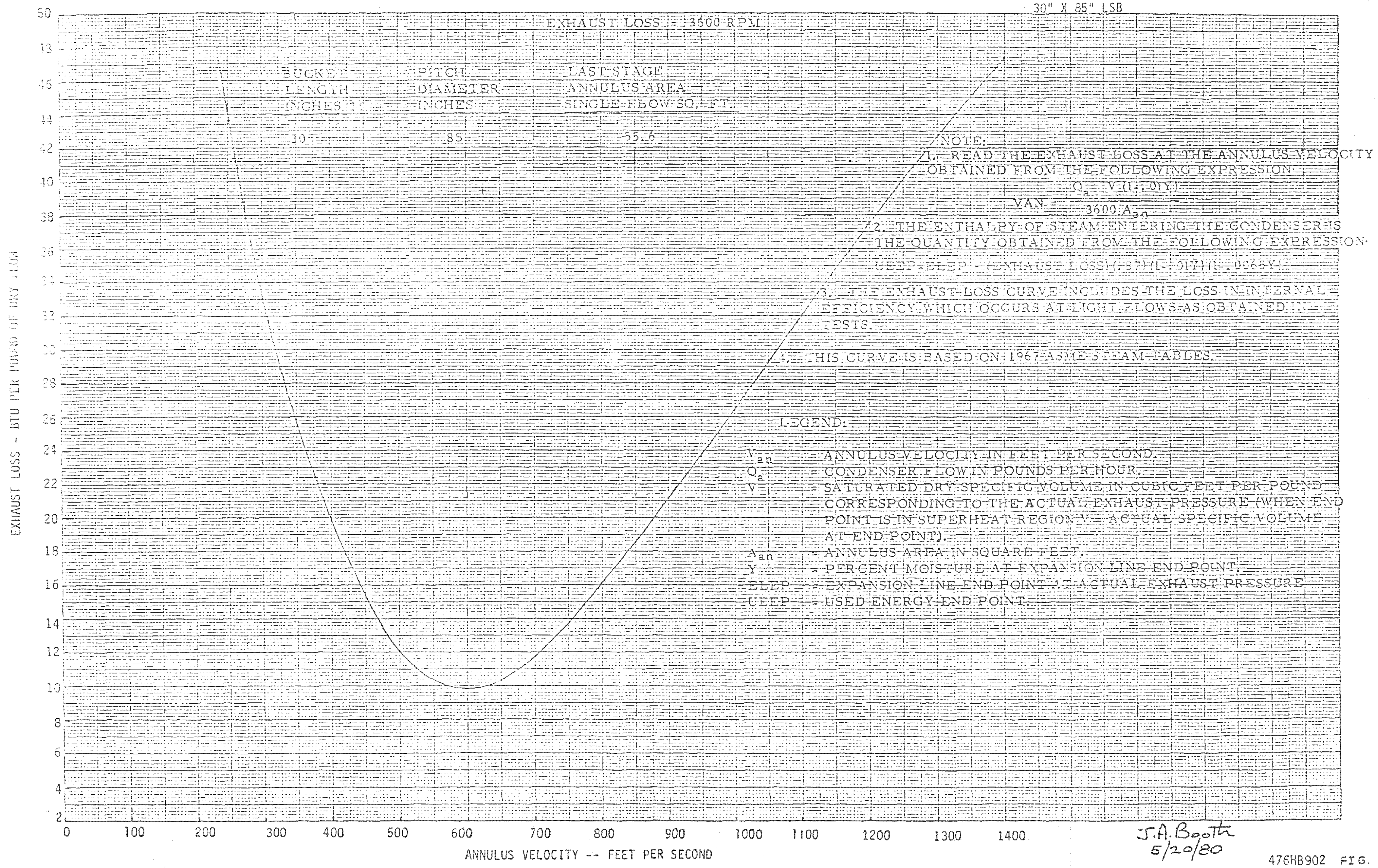
5/20/80

476HB902 FIG. 8A

IP14_005057

476HB902

3600 RPM
30" X 85" LSB



J.A. Booth
5/20/80

476HB902 FIG. 8A

IP14_005058

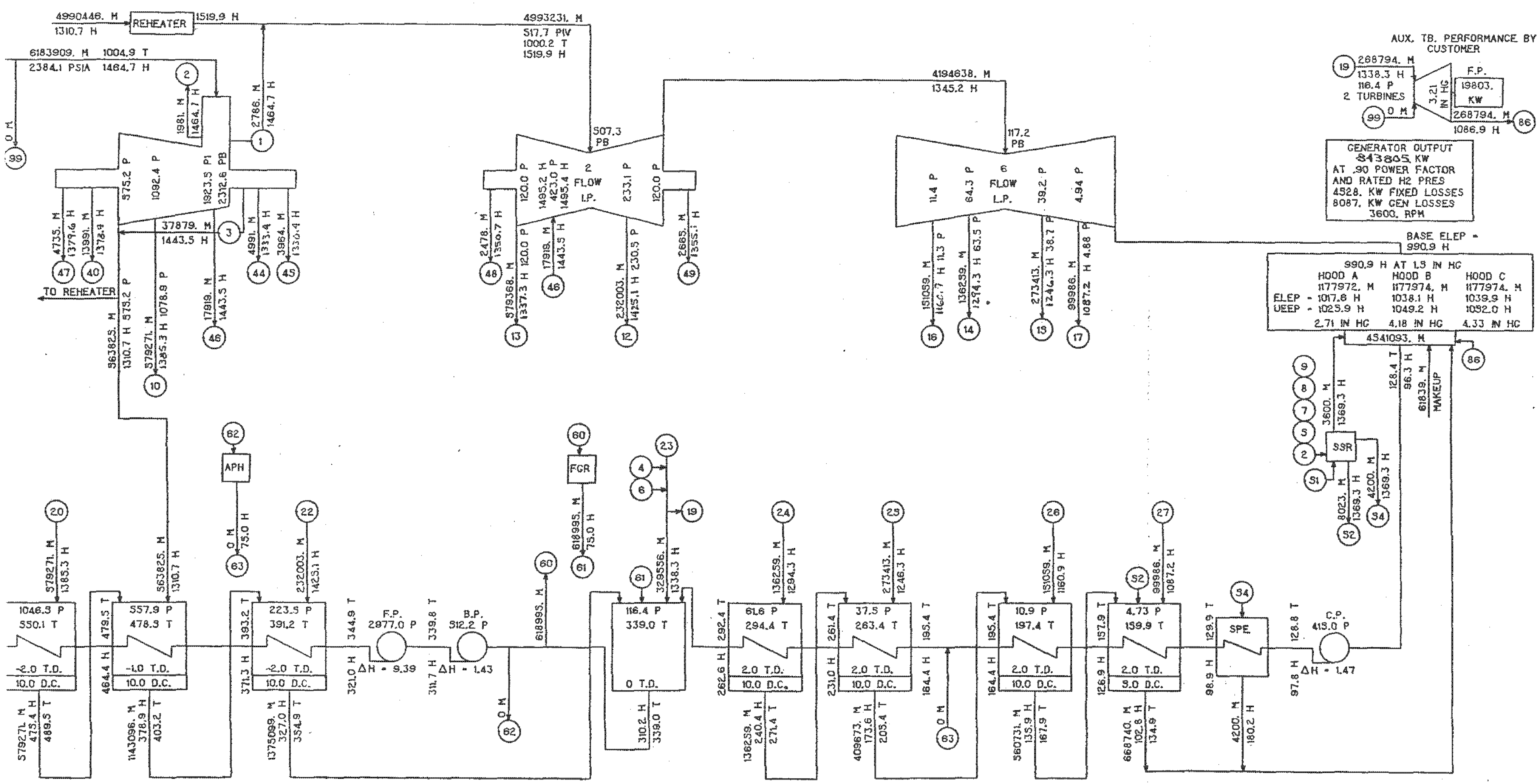
'G. 9A

TURBINE AND EXTRACTION ARRANGEMENT IS SCHEMATIC ONLY

CALCULATED DATA - NOT GUARANTEED

RATING FLOW IS 5979059. M AT INLET STEAM CONDITIONS OF 2412.2 PSIA AND 1000.0 T TO ASSURE THAT THE TURBINE WILL PASS THIS FLOW, CONSIDERING VARIATIONS IN FLOW COEFFICIENTS FROM EXPECTED VALUES, SHOP TOLERANCES ON DRAWING AREAS, ETC. WHICH MAY AFFECT THE FLOW, THE TURBINE IS BEING DESIGNED FOR A DESIGN FLOW (RATING FLOW PLUS 5.0 PERCENT) OF 6278012. M THE EQUIVALENT DESIGN FLOW AT 2384.1 PSIA AND 1004.9 T IS 6183893. M .
THE VALUE OF GENERATOR OUTPUT SHOWN ON THIS HEAT BALANCE IS AFTER ALL POWER FOR EXCITATION AND OTHER TURBINE-GENERATOR AUXILIARIES HAS BEEN DEDUCTED.

CONTRACT CYCLE HEAT BALANCE TEST No. 2



4541093 (1.47)
+6183.9 (718.4 - 548.8)
+6183909. (1464.7 - 548.8)
POINT +4990446. (1519.9 - 1310.7) = 7985.9 BTU/KW-HR
TE 843805.

LEGEND - CALCULATIONS BASED ON 1967 ASME STEAM TABLES
M - FLOW-LB/HR
P - PRESSURE-PSIA
H - ENTHALPY-BTU/LB
T - TEMPERATURE-F DEGREES

9948T 1 0 1

KW / / IN HG ABS.
CONTRACT CYCLE HEAT BALANCE TEST NO.2
TC6F 30.0 IN. LSB 3600 RPM
2400.0 PSIA 1000. / 1000. T
GEN- 991000. KVA .90 PF LIQ

FIG. 9A

5/14/87

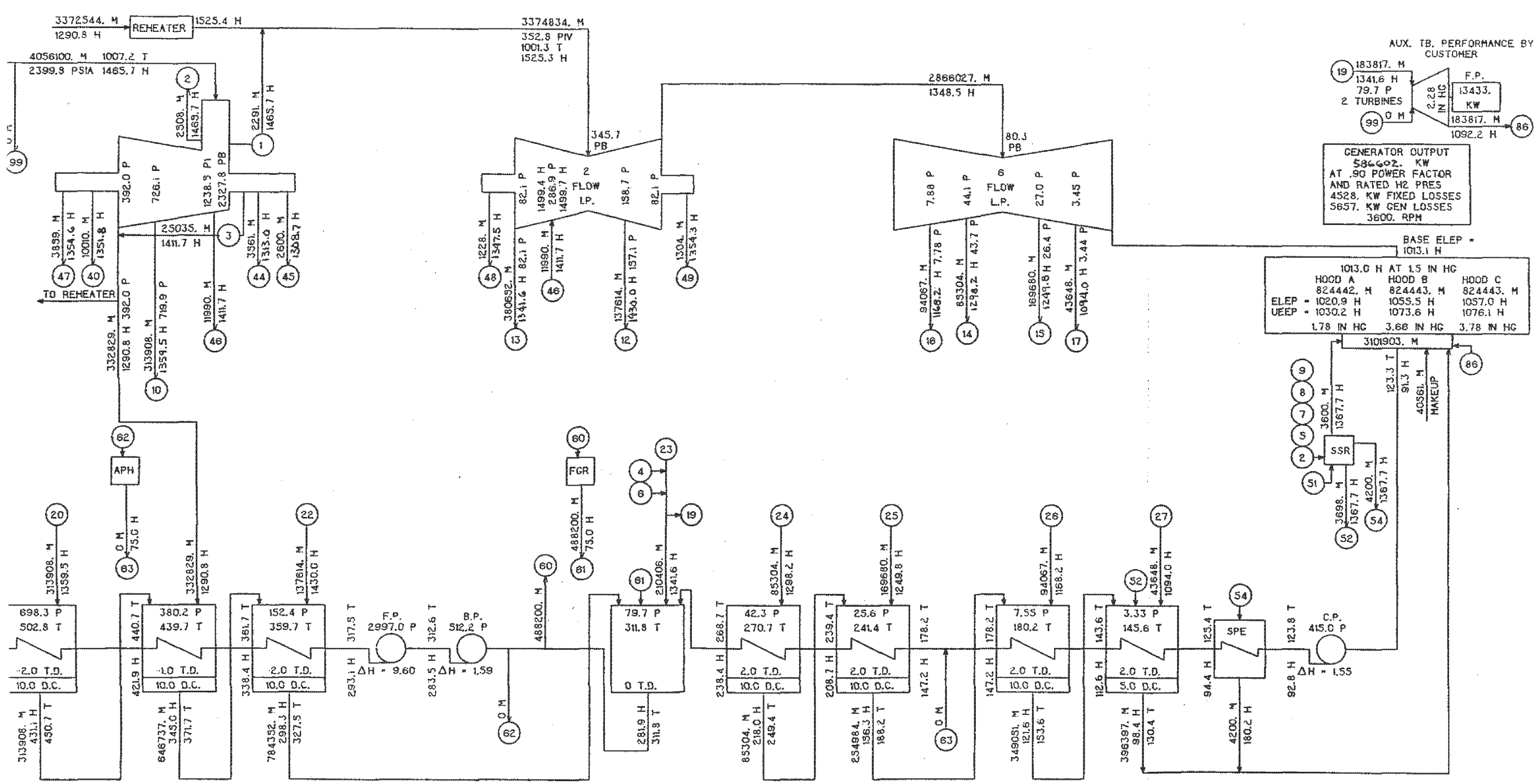
RAL ELECTRIC COMPANY. SCHENECTADY N.Y.

G. 9B

TURBINE AND EXTRACTION ARRANGEMENT IS SCHEMATIC ONLY

CONTRACT CYCLE HEAT BALANCE TEST No. 3

THE VALUE OF GENERATOR OUTPUT SHOWN ON THIS HEAT BALANCE IS AFTER ALL POWER FOR EXCITATION AND OTHER TURBINE-GENERATOR AUXILIARIES HAS BEEN DEDUCTED.



POINT
TE

$$\frac{\begin{array}{l}3101903\ (1.55)\\ +4056.1\ (720.3-493.0)\\ +4056100.\ (1465.7-493.0)\\ +3372544.\ (1525.4-1290.8)\end{array}}{586602.} = 8084.6\ \frac{\text{BTU}}{\text{KW-HR}}$$

LEGEND - CALCULATIONS BASED ON 1967 ASME STEAM TABLES
M - FLOW-LB/HR
P - PRESSURE-PSIA
H - ENTHALPY-BTU/LB
T - TEMPERATURE-F DEGREES

9046T 1 0 1

KW / / IN HG ABS.
CONTRACT CYCLE HEAT BALANCE TEST NO.3
TC6F 30.0 IN. LSB 3600 RPM
2400.0 PSIA 1000. / 1000. F
GEN- 991000. KVA .90 PF LIQ

RAL ELECTRIC COMPANY. SCHENECTADY N.Y.

5/14/87

Fig. 9B

IP14_005060

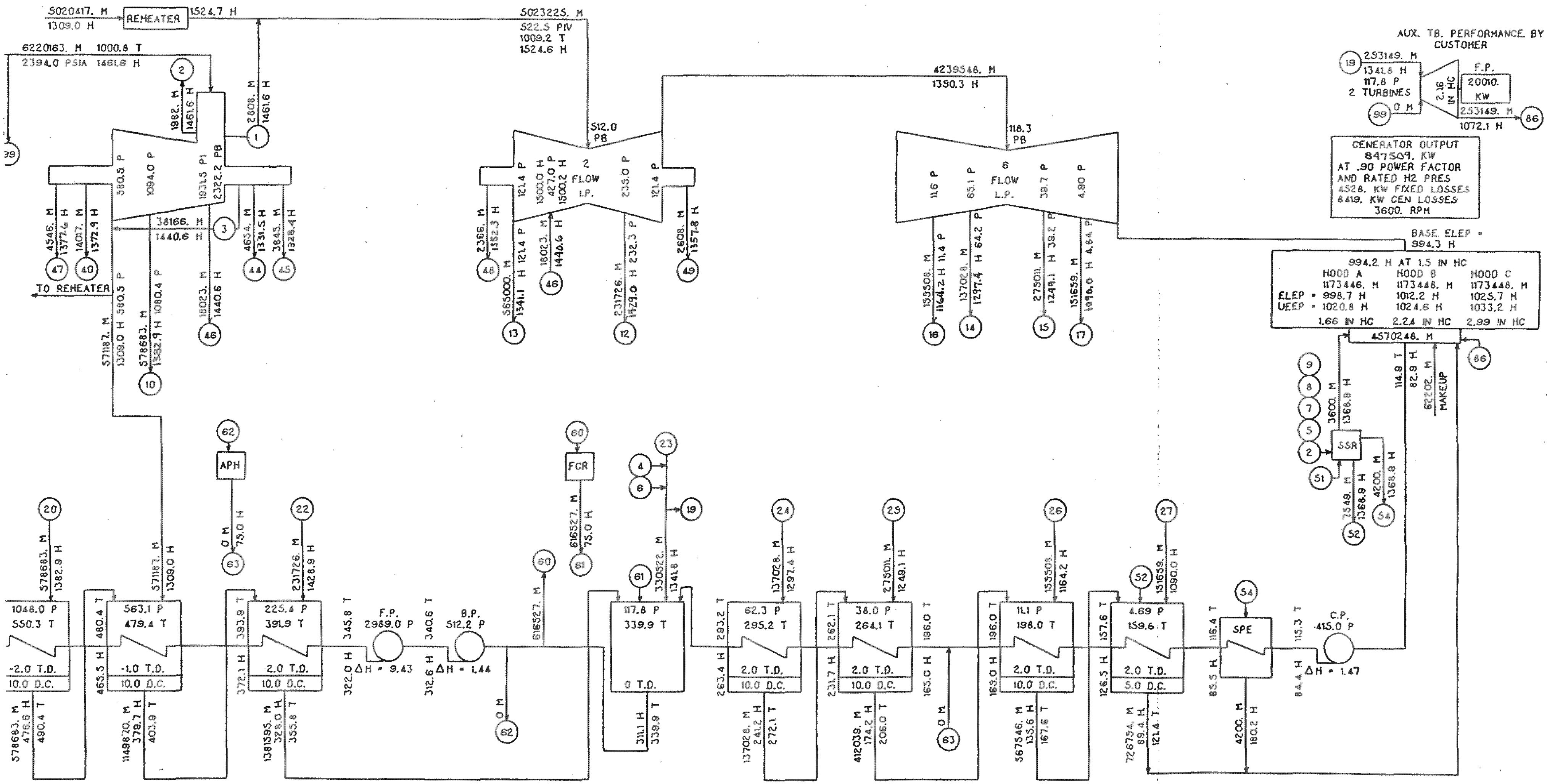
:. 9C

TURBINE AND EXTRACTION ARRANGEMENT IS SCHEMATIC ONLY

CALCULATED DATA - NOT GUARANTEED

CONTRACT CYCLE HEAT BALANCE TEST No. 4

RATING FLOW IS 5974568. M AT INLET STEAM CONDITIONS OF 2412.2 PSIA AND 1000.0 T TO ASSURE THAT THE TURBINE WILL PASS THIS FLOW, CONSIDERING VARIATIONS IN FLOW COEFFICIENTS FROM EXPECTED VALUES, SHOP TOLERANCES ON DRAWING AREAS, ETC. WHICH MAY AFFECT THE FLOW, THE TURBINE IS BEING DESIGNED FOR A DESIGN FLOW (RATING FLOW PLUS 5.0 PERCENT) OF 6273296. M
THE EQUIVALENT DESIGN FLOW AT 2394.0 PSIA AND 1000.8 T IS 6220150. M .
THE VALUE OF GENERATOR OUTPUT SHOWN ON THIS HEAT BALANCE IS AFTER ALL POWER FOR EXCITATION AND OTHER TURBINE-GENERATOR AUXILIARIES HAS BEEN DEDUCTED.



POINT HEAT RATE = $\dfrac{4570246.\,(1.47) + 6620.2\,(719.6 - 549.0) + 6220163.\,(1461.6 - 549.0) + 5020417.\,(1524.7 - 1309.0)}{847509.} = 7984.9$ BTU/KW-HR

LEGEND - CALCULATIONS BASED ON 1967 ASME STEAM TABLES
M - FLOW-LB/HR
P - PRESSURE-PSIA
H - ENTHALPY-BTU/LB
T - TEMPERATURE-F DEGREES

KW / / IN HG ABS.
CONTRACT CYCLE HEAT BALANCE TEST NO. 4
TC6F 30.0 IN. LSB 3600 RPM
2400.0 PSIA 1000. / 1000. T
GEN- 991000. KVA .90 PF LIQ

9694T 1 0 1

Fig. 9C

5/14/87

AL ELECTRIC COMPANY, SCHENECTADY N.Y.

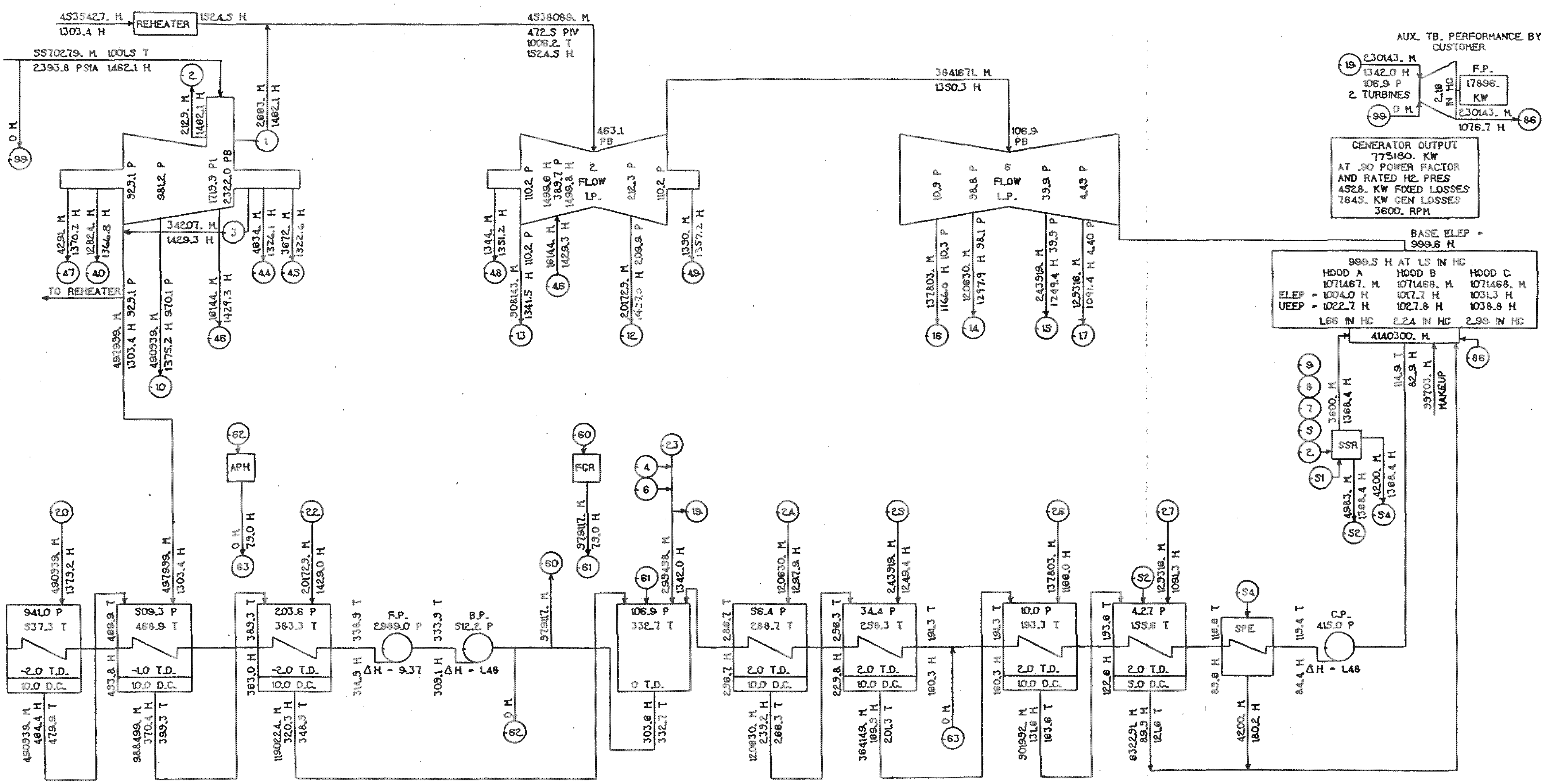
IP14_005061

FIG. 9D

CONTRACT CYCLE HEAT BALANCE TEST No.5

TURBINE AND EXTRACTION ARRANGEMENT IS SCHEMATIC ONLY

THE VALUE OF GENERATOR OUTPUT SHOWN ON THIS HEAT BALANCE IS AFTER ALL POWER FOR EXCITATION AND OTHER TURBINE-GENERATOR AUXILIARIES HAS BEEN DEDUCTED.



$$\text{POINT RATE} = \frac{\begin{array}{c}4146300. \; (1.48) \\ +99703. \; (719.6 - 533.2) \\ +5570279. \; (1462.1 - 533.2) \\ +4535427. \; (1524.5 - 1303.4)\end{array}}{775180.} = 7977.7 \; \frac{\text{BTU}}{\text{KW-HR}}$$

LEGEND - CALCULATIONS BASED ON 1967 ASME STEAM TABLES
M - FLOW-LB/HR
P - PRESSURE-PSIA
H - ENTHALPY-BTU/LB
T - TEMPERATURE-F DEGREES

9610T 1 0 1

KW / / IN HG ABS.
CONTRACT CYCLE HEAT BALANCE TEST NO.5
TCSF 30.0 IN. LSB 3600 RPM
2400.0 PSIA 1000. / 1000. T
GEN- 981000. KVA .90 PF LIQ

[GEN]ERAL ELECTRIC COMPANY. SCHENECTADY N.Y.

5/14/87

FIG. 9D

IP14_005062

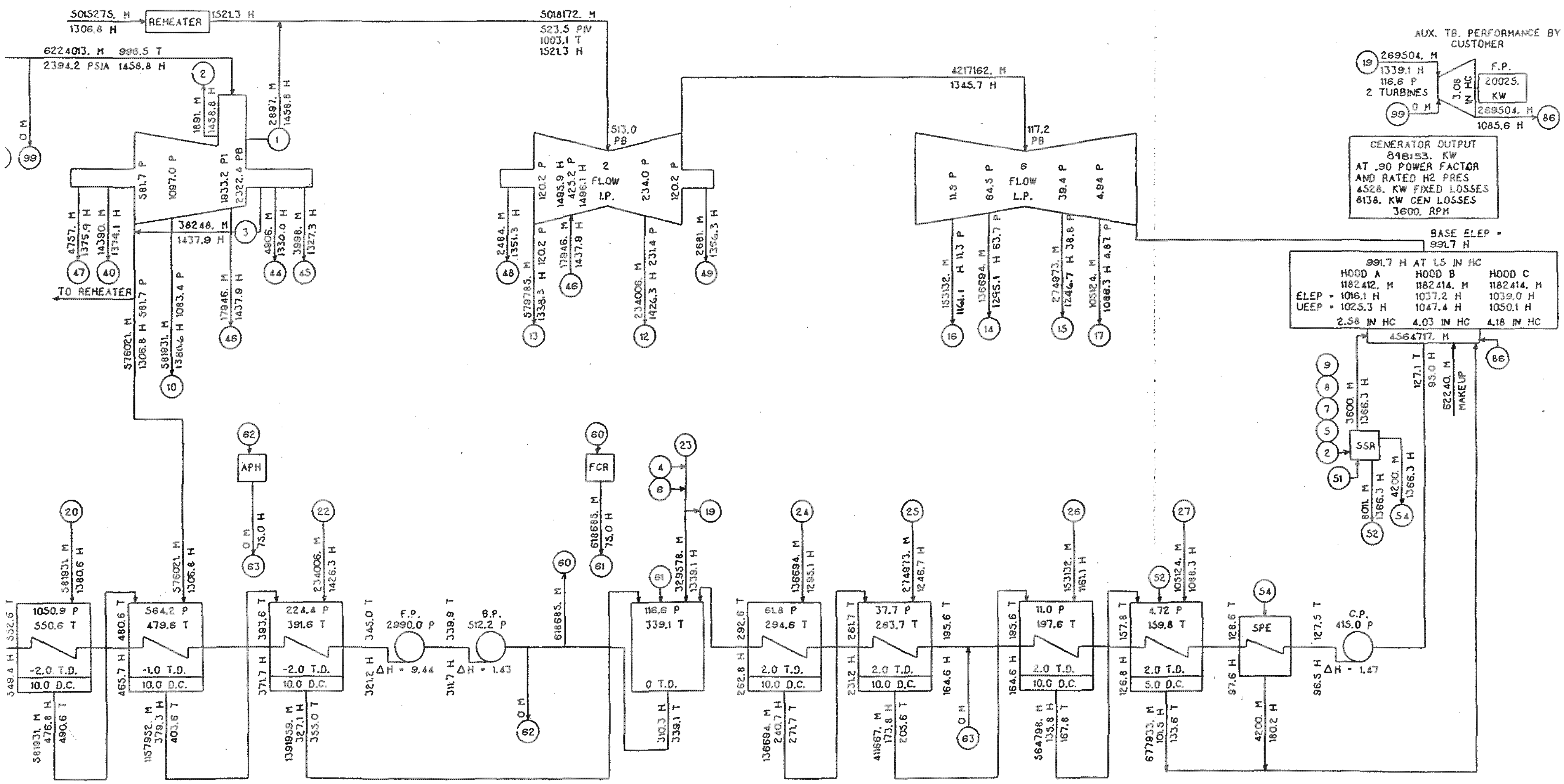
FIG. 9E

CONTRACT CYCLE HEAT BALANCE TEST No. 6

TURBINE AND EXTRACTION ARRANGEMENT IS SCHEMATIC ONLY

CALCULATED DATA - NOT GUARANTEED

RATING FLOW IS 5963946. M AT INLET STEAM CONDITIONS OF 2412.2 PSIA AND 1000.0 T TO ASSURE THAT THE TURBINE WILL PASS THIS FLOW. CONSIDERING VARIATIONS IN FLOW COEFFICIENTS FROM EXPECTED VALUES, SHOP TOLERANCES ON DRAWING AREAS, ETC. WHICH MAY AFFECT THE FLOW, THE TURBINE IS BEING DESIGNED FOR A DESIGN FLOW (RATING FLOW PLUS 5.0 PERCENT) OF 6262143. M
THE EQUIVALENT DESIGN FLOW AT 2394.2 PSIA AND 996.5 T IS 6223999. M .
THE VALUE OF GENERATOR OUTPUT SHOWN ON THIS HEAT BALANCE IS AFTER ALL POWER FOR EXCITATION AND OTHER TURBINE-GENERATOR AUXILIARIES HAS BEEN DEDUCTED.



$$\text{[?]T POINT RATE} = \frac{4564717.\,(1.47) + 6224.0\,(719.6 - 549.4) + 6224013.\,(1458.8 - 549.4) + 5015275.\,(1521.3 - 1306.8)}{848153.} = 7951.3\ \frac{\text{BTU}}{\text{KW-HR}}$$

LEGEND - CALCULATIONS BASED ON 1967 ASME STEAM TABLES
M - FLOW-LB/HR
P - PRESSURE-PSIA
H - ENTHALPY-BTU/LB
T - TEMPERATURE-F DEGREES

9613T 1 0 1

KW / / IN HG ABS.
CONTRACT CYCLE HEAT BALANCE TEST NO.6
TC6F 30.0 IN. LSB 3600 RPM
2400.0 PSIA 1000. / 1000. T
GEN- 991000. KVA .90 PF LIQ

FIG. 9E

[?]ERAL ELECTRIC COMPANY. SCHENECTADY N.Y.

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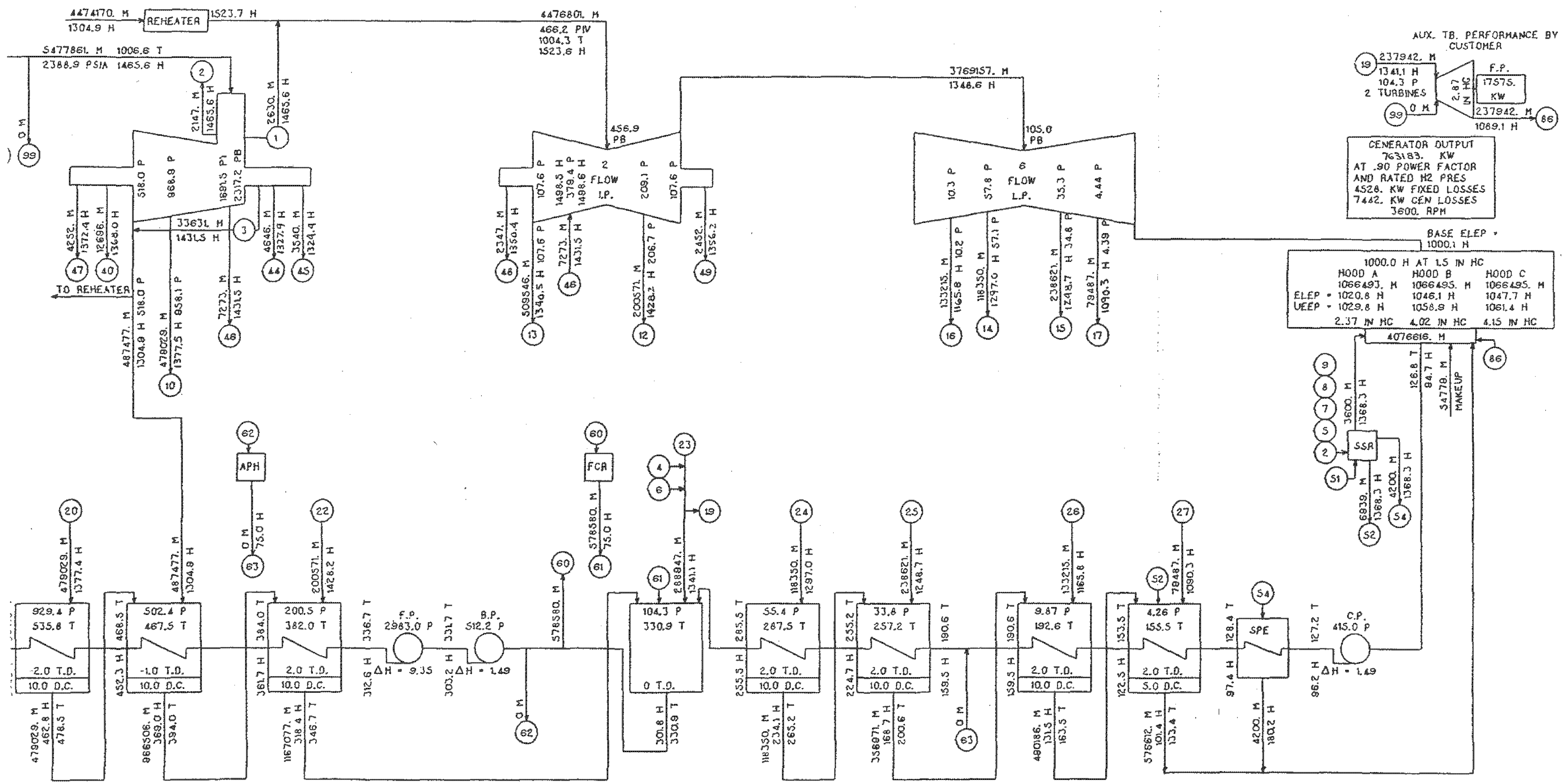
FIG. 9F

CONTRACT CYCLE HEAT BALANCE TEST No.7

TURBINE AND EXTRACTION ARRANGEMENT IS SCHEMATIC ONLY

THE VALUE OF GENERATOR OUTPUT SHOWN ON THIS HEAT BALANCE IS AFTER ALL POWER FOR EXCITATION AND OTHER TURBINE-GENERATOR AUXILIARIES HAS BEEN DEDUCTED.



$$\frac{\begin{array}{l}4076616.\ (1.49)\\ +5477.9\ (719.0-531.5)\\ +5477861\ (1465.6-531.5)\\ +4474170.\ (1523.7-1304.9)\end{array}}{763183.} = 7996.9\ \frac{BTU}{KW\text{-}HR}$$

: POINT
RATE

LEGEND - CALCULATIONS BASED ON 1967 ASME STEAM TABLES
M - FLOW-LB/HR
P - PRESSURE-PSIA
H - ENTHALPY-BTU/LB
T - TEMPERATURE-F DEGREES

9619T 1 0 1

KW / / IN HC ABS.
CONTRACT CYCLE HEAT BALANCE TEST NO.7
TC6F 30.0 IN. LSB 3600 RPM
2400.0 PSIA 1000. / 1000. T
GEN- 991000. KVA .90 PF LIQ

ERAL ELECTRIC COMPANY, SCHENECTADY N.Y.

5/14/87
FIG. 9F

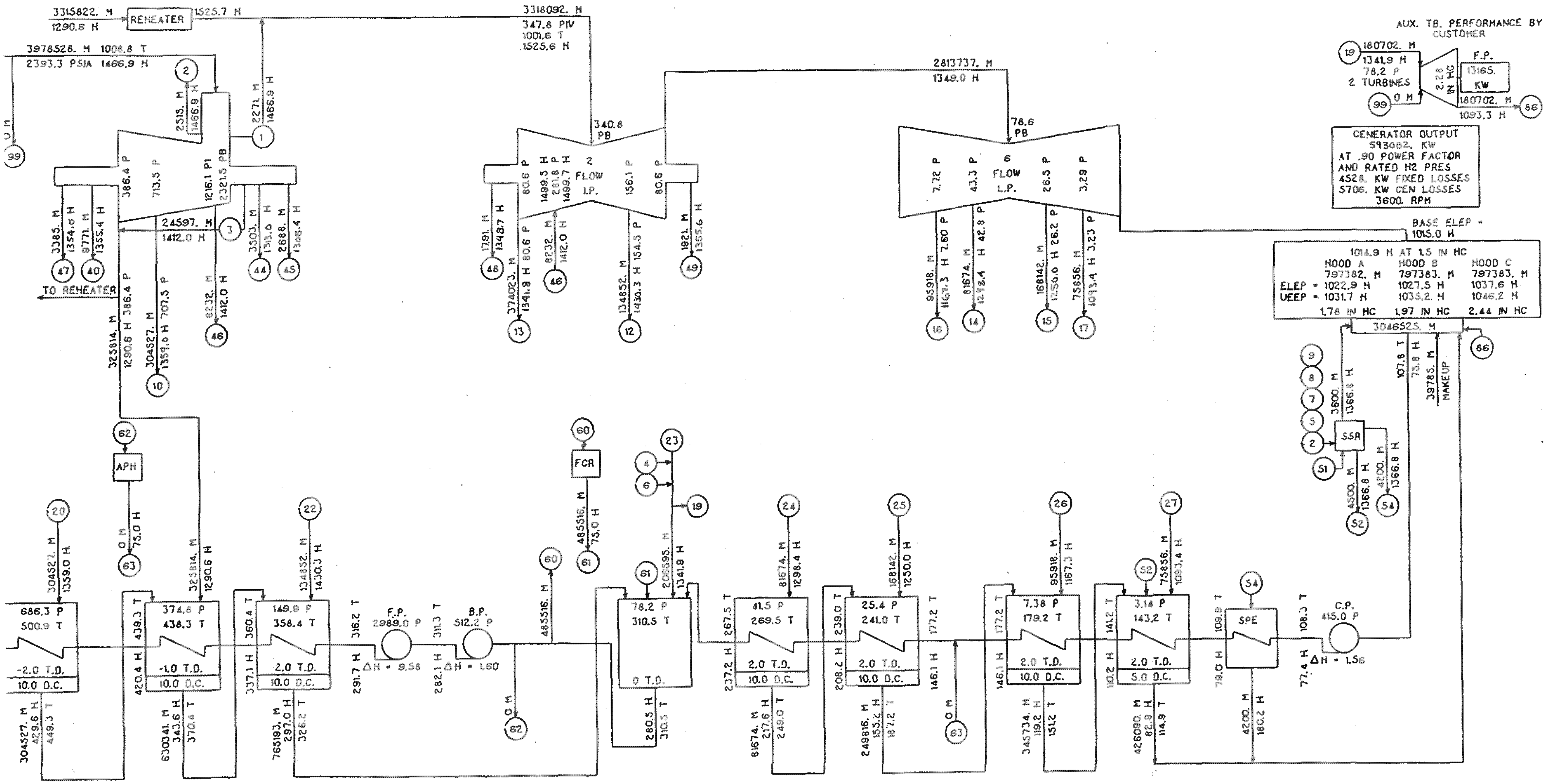
IP14_005064

C. 9G

CONTRACT CYCLE HEAT BALANCE TEST No. 9

TURBINE AND EXTRACTION ARRANGEMENT IS SCHEMATIC ONLY

THE VALUE OF GENERATOR OUTPUT SHOWN ON THIS HEAT BALANCE IS AFTER ALL POWER FOR EXCITATION AND OTHER TURBINE-GENERATOR AUXILIARIES HAS BEEN DEDUCTED.



$$\text{POINT RATE} = \frac{3978.5\ (719.5 - 490.8) + 3046525.\ (1.56) + 3978528.\ (1466.9 - 490.8) + 3315822.\ (1525.7 - 1290.6)}{593082.} = 7872.3\ \frac{\text{BTU}}{\text{KW-HR}}$$

LEGEND - CALCULATIONS BASED ON 1967 ASME STEAM TABLES
M - FLOW-LB/HR
P - PRESSURE-PSIA
H - ENTHALPY-BTU/LB
T - TEMPERATURE-F DEGREES

9799T 1 0 1

KW / / IN HG ABS.
CONTRACT CYCLE HEAT BALANCE TEST NO.9
TC6F 30.0 IN. LSB 3600 RPM
2400.0 PSIA 1000. / 1000. T
GEN- 991000. KVA .90 PF L10

ERAL ELECTRIC COMPANY. SCHENECTADY N.Y.

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FIG. 9G

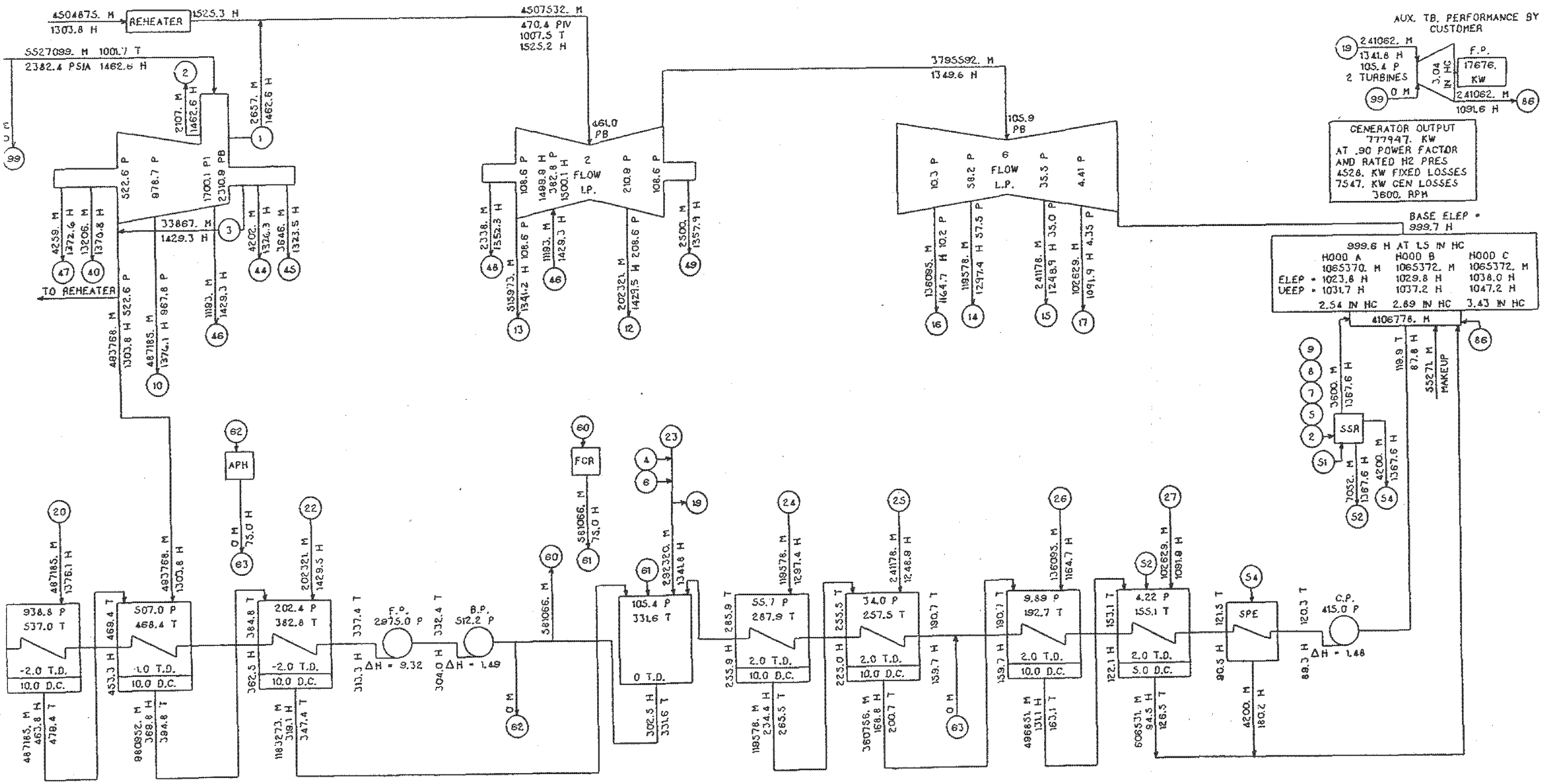
IP14_005065

:. 9H

CONTRACT CYCLE HEAT BALANCE TEST No. 10

TURBINE AND EXTRACTION ARRANGEMENT IS SCHEMATIC ONLY

THE VALUE OF GENERATOR OUTPUT SHOWN ON THIS HEAT BALANCE IS AFTER ALL POWER FOR EXCITATION AND OTHER TURBINE-GENERATOR AUXILIARIES HAS BEEN DEDUCTED.



$$\text{POINT RATE} = \frac{4106778.\ (1.48) + 5527.1\ (718.2 - 532.9) + 5527099.\ (1462.6 - 532.9) + 4504875.\ (1525.3 - 1303.8)}{777947.} = 7897.2\ \frac{\text{BTU}}{\text{KW-HR}}$$

LEGEND - CALCULATIONS BASED ON 1967 ASME STEAM TABLES
M - FLOW-LB/HR
P - PRESSURE-PSIA
H - ENTHALPY-BTU/LB
T - TEMPERATURE-F DEGREES

9624T 1 0 1

KW / / IN HC ABS.
CONTRACT CYCLE HEAT BALANCE TEST NO.10
TC6F 30.0 IN. LSB 3600 RPM
2400.0 PSIA 1000. / 1000. T
GEN- 991000. KVA .90 PF .10

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FIG. 9H

ERAL ELECTRIC COMPANY, SCHENECTADY N.Y.

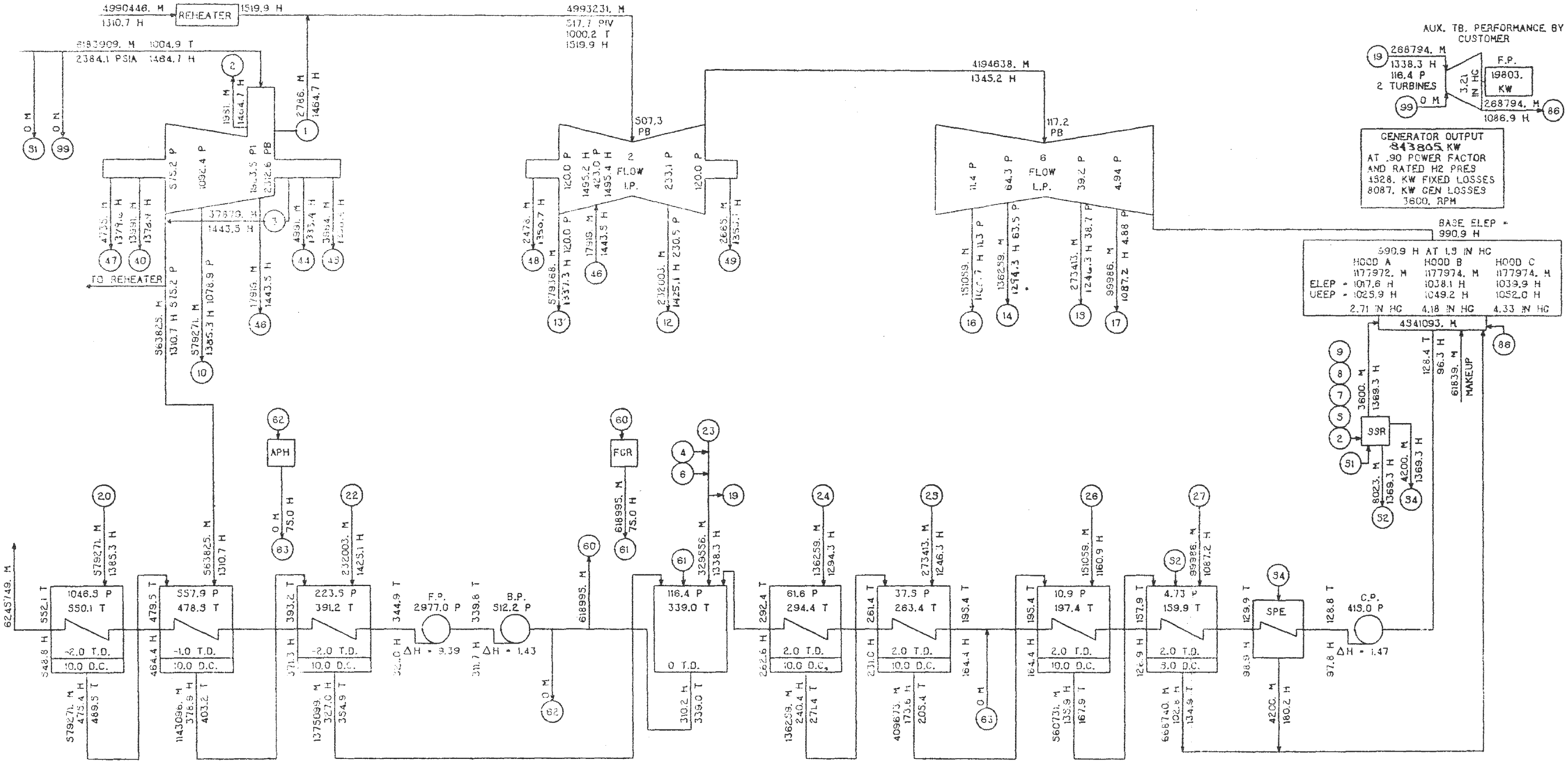
FIG. 9A

TURBINE AND EXTRACTION ARRANGEMENT IS SCHEMATIC ONLY

CALCULATED DATA - NOT GUARANTEED

RATING FLOW IS 5979059. M AT INLET STEAM CONDITIONS OF 2412.2 PSIA AND 1000.0 T TO ASSURE THAT THE TURBINE WILL PASS THIS FLOW, CONSIDERING VARIATIONS IN FLOW COEFFICIENTS FROM EXPECTED VALUES, SHOP TOLERANCES ON DRAWING AREAS, ETC. WHICH MAY AFFECT THE FLOW, THE TURBINE IS BEING DESIGNED FOR A DESIGN FLOW (RATING FLOW PLUS 5.0 PERCENT) OF 6278012. M
THE EQUIVALENT DESIGN FLOW AT 2384.1 PSIA AND 1004.9 T IS 6183899. M .
THE VALUE OF GENERATOR OUTPUT SHOWN ON THIS HEAT BALANCE IS AFTER ALL POWER FOR EXCITATION AND OTHER TURBINE-GENERATOR AUXILIARIES HAS BEEN DEDUCTED.

CONTRACT CYCLE HEAT BALANCE TEST No. 2



4541093 (1.47)
+6183.9 (716.4 - 548.8)
+6183909. (1464.7 - 548.8)
VALVE BEST POINT NET HEAT RATE = +4990448. (1519.9 - 1310.7) / 843805. = 7985.1 BTU/KW-HR

LEGEND - CALCULATIONS BASED ON 1967 ASME STEAM TABLES
M - FLOW-LB/HR
P - PRESSURE-PSIA
H - ENTHALPY-BTU/LB
T - TEMPERATURE-F DEGREES

KW / / IN HG ABS.
CONTRACT CYCLE HEAT BALANCE TEST NO.2
TC6F 30.0 IN. LSB 3600 RPM
2400.0 PSIA 1000. / 1000. T
GEN- 991000. KVA .90 PF LIQ

9948T 1 0 1

FIG. 9A

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GENERAL ELECTRIC COMPANY. SCHENECTADY N.Y.

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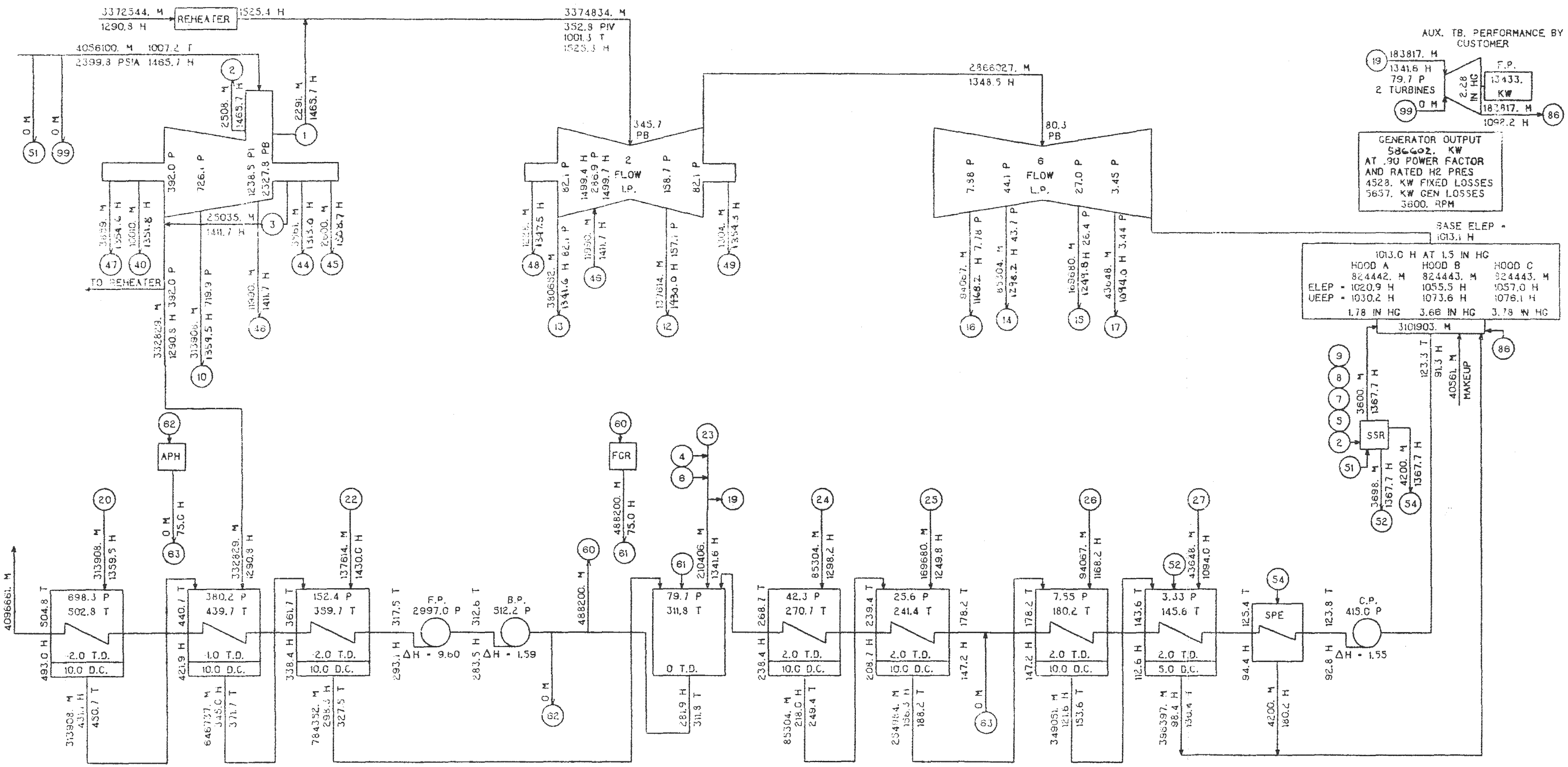
FIG. 9B

TURBINE AND EXTRACTION ARRANGEMENT IS SCHEMATIC ONLY

CONTRACT CYCLE HEAT BALANCE TEST No. 3

THE VALUE OF GENERATOR OUTPUT SHOWN ON THIS HEAT BALANCE IS AFTER ALL POWER FOR EXCITATION AND OTHER TURBINE-GENERATOR AUXILIARIES HAS BEEN DEDUCTED.



VALVE BEST POINT NET HEAT RATE = $\dfrac{3101903\,(1.55) + 40561\,(720.3 - 493.0) + 4056100\,(1465.7 - 493.0) + 3372544\,(1525.4 - 1290.8)}{586602.} = 8084.6$ $\dfrac{\text{BTU}}{\text{KW-HR}}$

LEGEND - CALCULATIONS BASED ON 1967 ASME STEAM TABLES
M - FLOW-LB/HR
P - PRESSURE-PSIA
H - ENTHALPY-BTU/LB
T - TEMPERATURE-F DEGREES

9C48T 1 0 1

KW / / IN HG ABS.
CONTRACT CYCLE HEAT BALANCE TEST NO.3
TC6F 30.0 IN. LSB 3600 RPM
2400.0 PSIA 1000. / 1000. T
GEN- 991000. KVA .90 PF L10

GENERAL ELECTRIC COMPANY. SCHENECTADY N.Y.

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Fig. 9B

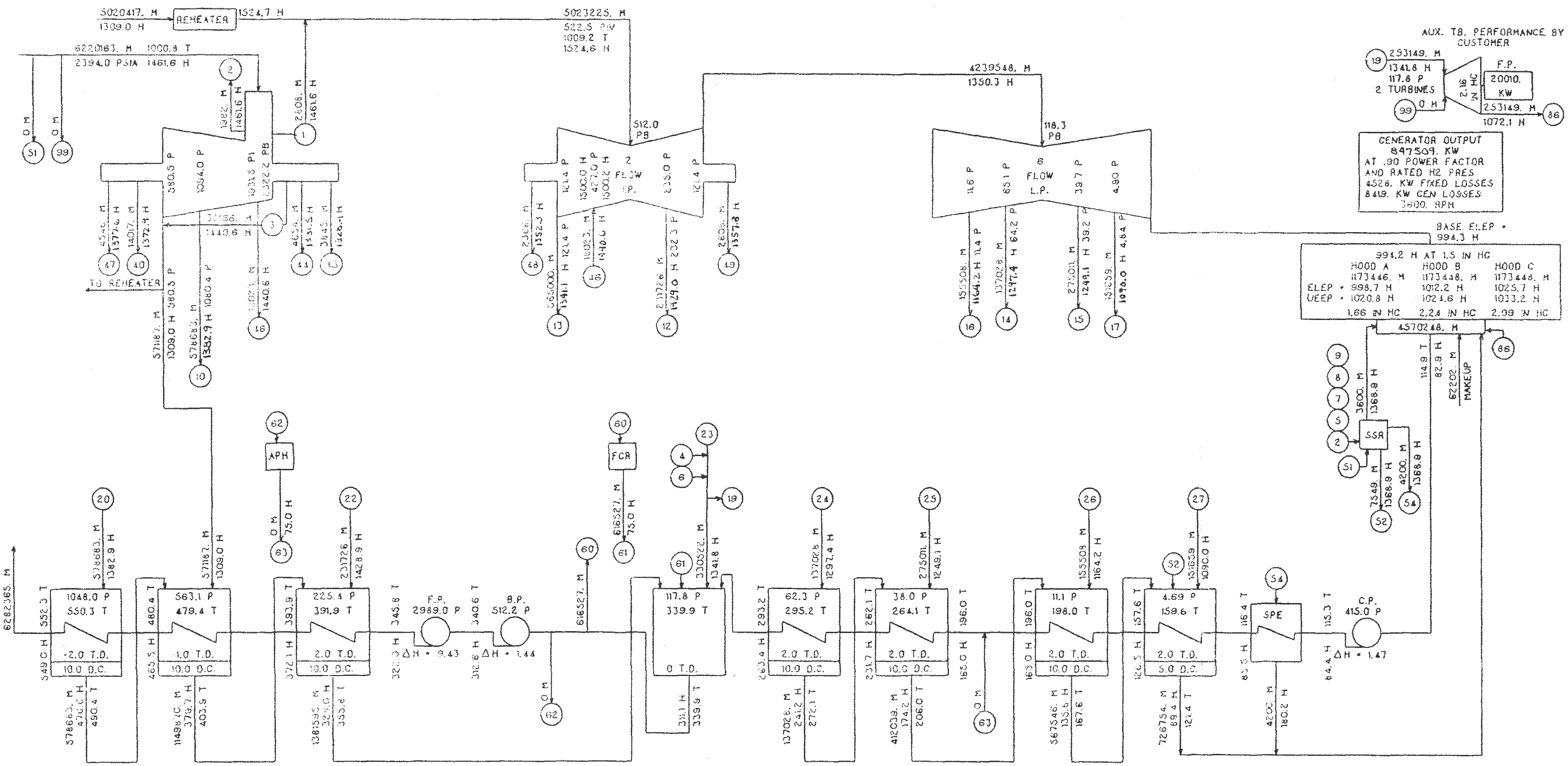
IP14_005068

FIG. 9C

TURBINE AND EXTRACTION ARRANGEMENT IS SCHEMATIC ONLY
CALCULATED DATA - NOT GUARANTEED

CONTRACT CYCLE HEAT BALANCE TEST No. 4

RATING FLOW IS 5974568. H AT INLET STEAM CONDITIONS OF 2412.2 PSIA AND 1000.0 T TO ASSURE THAT THE TURBINE WILL PASS THIS FLOW, CONSIDERING VARIATIONS IN FLOW COEFFICIENTS FROM EXPECTED VALUES, SHOP TOLERANCES ON DRAWING AREAS, ETC. WHICH MAY AFFECT THE FLOW, THE TURBINE IS BEING DESIGNED FOR A DESIGN FLOW (RATING FLOW PLUS 5.0 PERCENT) OF 6273296. H
THE EQUIVALENT DESIGN FLOW AT 2394.0 PSIA AND 1000.8 T IS 6220150. H .
THE VALUE OF GENERATOR OUTPUT SHOWN ON THIS HEAT BALANCE IS AFTER ALL POWER FOR EXCITATION AND OTHER TURBINE-GENERATOR AUXILIARIES HAS BEEN DEDUCTED.



$$\text{VALVE BEST POINT NET HEAT RATE} = \frac{4570248.(1.47) + 6620.2\,(719.6 - 549.0) + 6220163.\,(1461.6 - 549.0) + 5020417.\,(1524.7 - 1309.0)}{847509.} = 7984.9\ \frac{\text{BTU}}{\text{KW-HR}}$$

LEGEND - CALCULATIONS BASED ON 1967 ASME STEAM TABLES
M - FLOW-LB/HR
P - PRESSURE-PSIA
H - ENTHALPY-BTU/LB
T - TEMPERATURE-F DEGREES

KW / / IN HG ABS.
CONTRACT CYCLE HEAT BALANCE TEST NO. 4
TC6F 30.0 IN. LSB 3600 RPM
2400.0 PSIA 1000. / 1000. T
GEN- 991000. KVA .90 PF LIQ

9694T 1 0 1

Fig. 9C
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GENERAL ELECTRIC COMPANY, SCHENECTADY N.Y.

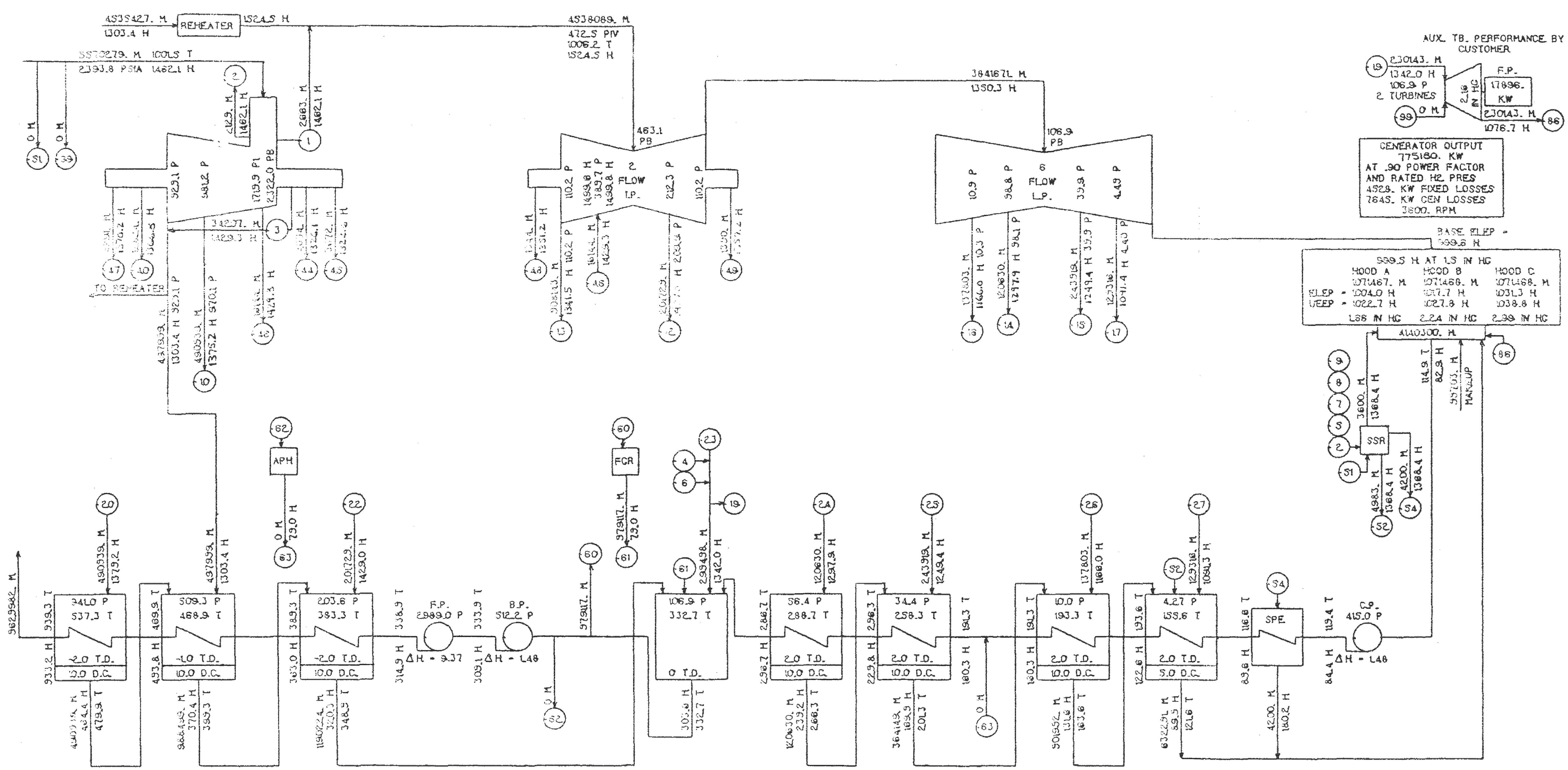
IP14_005069

FIG. 9D

TURBINE AND EXTRACTION ARRANGEMENT IS SCHEMATIC ONLY

CONTRACT CYCLE HEAT BALANCE TEST No.5

THE VALUE OF GENERATOR OUTPUT SHOWN ON THIS HEAT BALANCE IS AFTER ALL POWER FOR EXCITATION AND OTHER TURBINE-GENERATOR AUXILIARIES HAS BEEN DEDUCTED.



VALVE BEST POINT NET HEAT RATE = $\frac{4140300.\,(1.48) + 9970.3\,(719.6 - 533.2) + 3570279.\,(1462.1 - 533.2) + 4535427.\,(1524.5 - 1303.4)}{775180.} = 7977.7\ \frac{\text{BTU}}{\text{KW-HR}}$

LEGEND - CALCULATIONS BASED ON 1967 ASME STEAM TABLES
M - FLOW-LB/HR
P - PRESSURE-PSIA
H - ENTHALPY-BTU/LB
T - TEMPERATURE-F DEGREES

9610T 1 0 1

KW / / IN HG ABS.
CONTRACT CYCLE HEAT BALANCE TEST NO.5
TC6F 30.0 IN. LS8 3600 RPM
2400.0 PSIA 1000. / 1000. T
GEN- 981000. KVA .90 PF LIQ

GENERAL ELECTRIC COMPANY, SCHENECTADY N.Y.

9/14/87
FIG. 9D

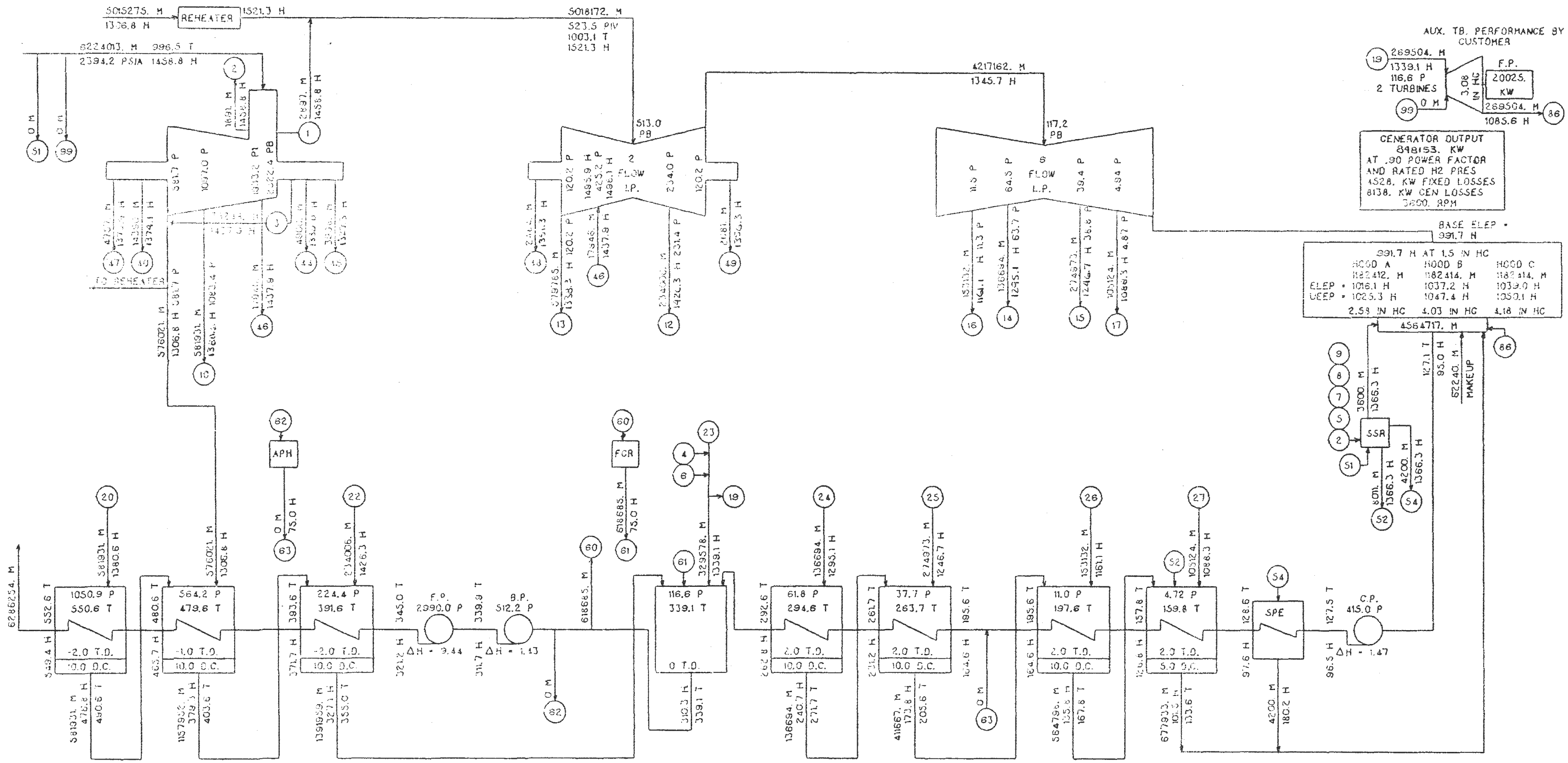
FIG. 9E

TURBINE AND EXTRACTION ARRANGEMENT IS SCHEMATIC ONLY

CALCULATED DATA - NOT GUARANTEED

CONTRACT CYCLE HEAT BALANCE TEST No. 6

RATING FLOW IS 5963946. M AT INLET STEAM CONDITIONS OF 2412.2 PSIA AND 1000.0 T
TO ASSURE THAT THE TURBINE WILL PASS THIS FLOW. CONSIDERING VARIATIONS IN FLOW COEFFICIENTS FROM EXPECTED VALUES. SHOP TOLERANCES ON DRAWING AREAS. ETC. WHICH MAY AFFECT THE FLOW. THE TURBINE IS BEING DESIGNED FOR A DESIGN FLOW (RATING FLOW PLUS 5.0 PERCENT) OF 6262143. M
THE EQUIVALENT DESIGN FLOW AT 2394.2 PSIA AND 996.5 T IS 6223999. M .
THE VALUE OF GENERATOR OUTPUT SHOWN ON THIS HEAT BALANCE IS AFTER ALL POWER FOR EXCITATION AND OTHER TURBINE-GENERATOR AUXILIARIES HAS BEEN DEDUCTED.



VALVE BEST POINT NET HEAT RATE = (4564717. (1.47) + 6224.0 (719.6 - 549.4) + 6224013. (1458.8 - 549.4) + 5015275. (1521.3 - 1306.8)) / 848153. = 7951.3 BTU/KW-HR

LEGEND - CALCULATIONS BASED ON 1967 ASME STEAM TABLES
M - FLOW-LB/HR
P - PRESSURE-PSIA
H - ENTHALPY-BTU/LB
T - TEMPERATURE-F DEGREES

9613T 1 0 1

KW / / IN HG ABS.
CONTRACT CYCLE HEAT BALANCE TEST NO.6
TC6F 30.0 IN. LSB 3600 RPM
2400.0 PSIA 1000. / 1000. T
GEN- 991000. KVA .90 PF LIQ

Fig. 9E

GENERAL ELECTRIC COMPANY. SCHENECTADY N.Y.

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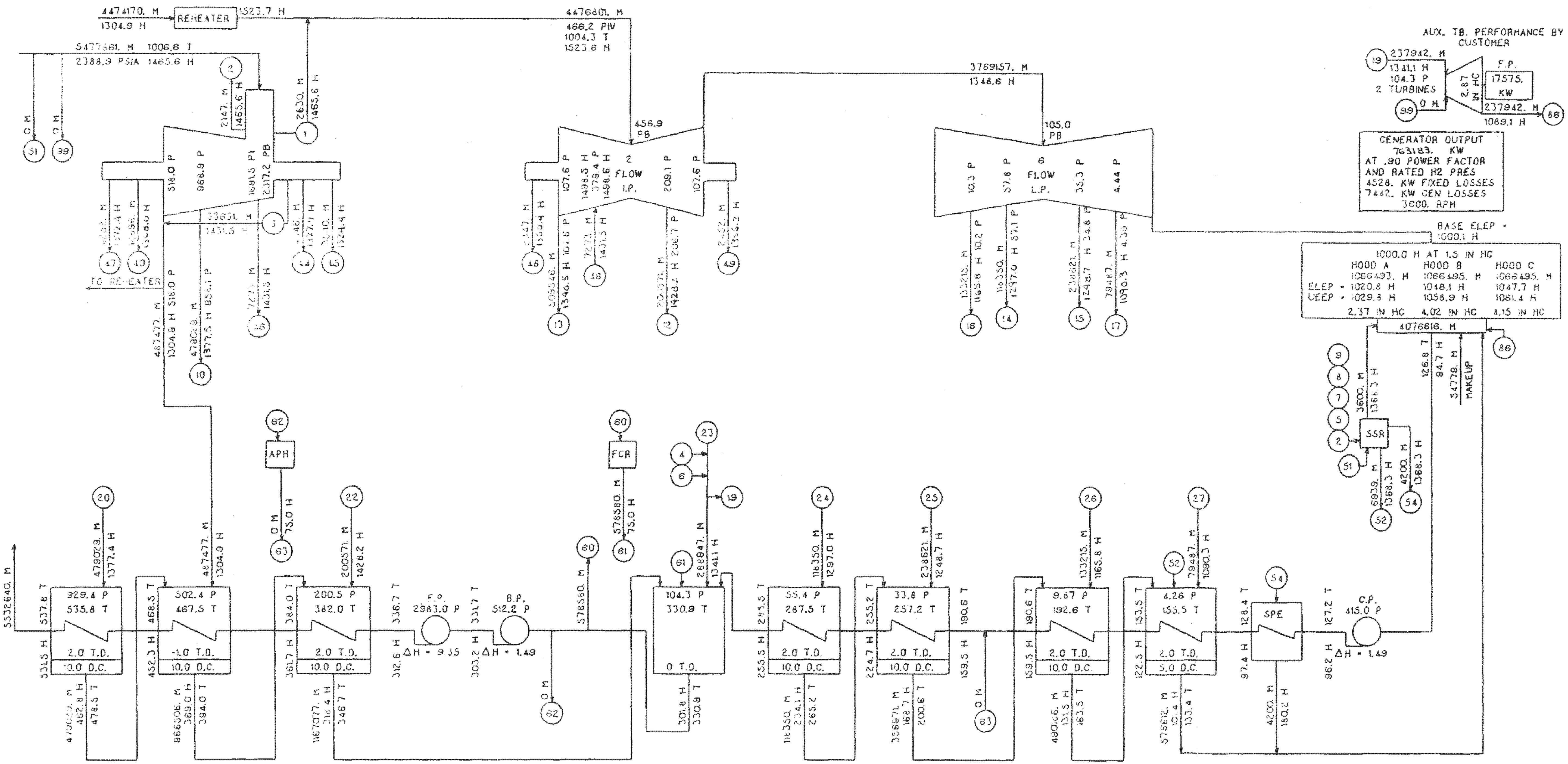
FIG. 9F

CONTRACT CYCLE HEAT BALANCE TEST No.7

TURBINE AND EXTRACTION ARRANGEMENT IS SCHEMATIC ONLY

THE VALUE OF GENERATOR OUTPUT SHOWN ON THIS HEAT BALANCE IS AFTER ALL POWER FOR EXCITATION AND OTHER TURBINE-GENERATOR AUXILIARIES HAS BEEN DEDUCTED.



VALVE BEST POINT NET HEAT RATE $= \dfrac{4076616.(1.49) + 5477.9(719.0 - 531.5) + 5477861.(1465.6 - 531.5) + 4474170.(1523.7 - 1304.9)}{763183.} = 7996.9\ \dfrac{\text{BTU}}{\text{KW-HR}}$

LEGEND - CALCULATIONS BASED ON 1967 ASME STEAM TABLES
M - FLOW-LB/HR
P - PRESSURE-PSIA
H - ENTHALPY-BTU/LB
T - TEMPERATURE-F DEGREES

9619T 1 0 1

KW / / IN HG ABS.
CONTRACT CYCLE HEAT BALANCE TEST NO.7
TC6F 30.0 IN. LSB 3600 RPM
2400.0 PSIA 1000. / 1000. T
GEN- 991000. KVA .90 PF LIQ

GENERAL ELECTRIC COMPANY, SCHENECTADY N.Y.

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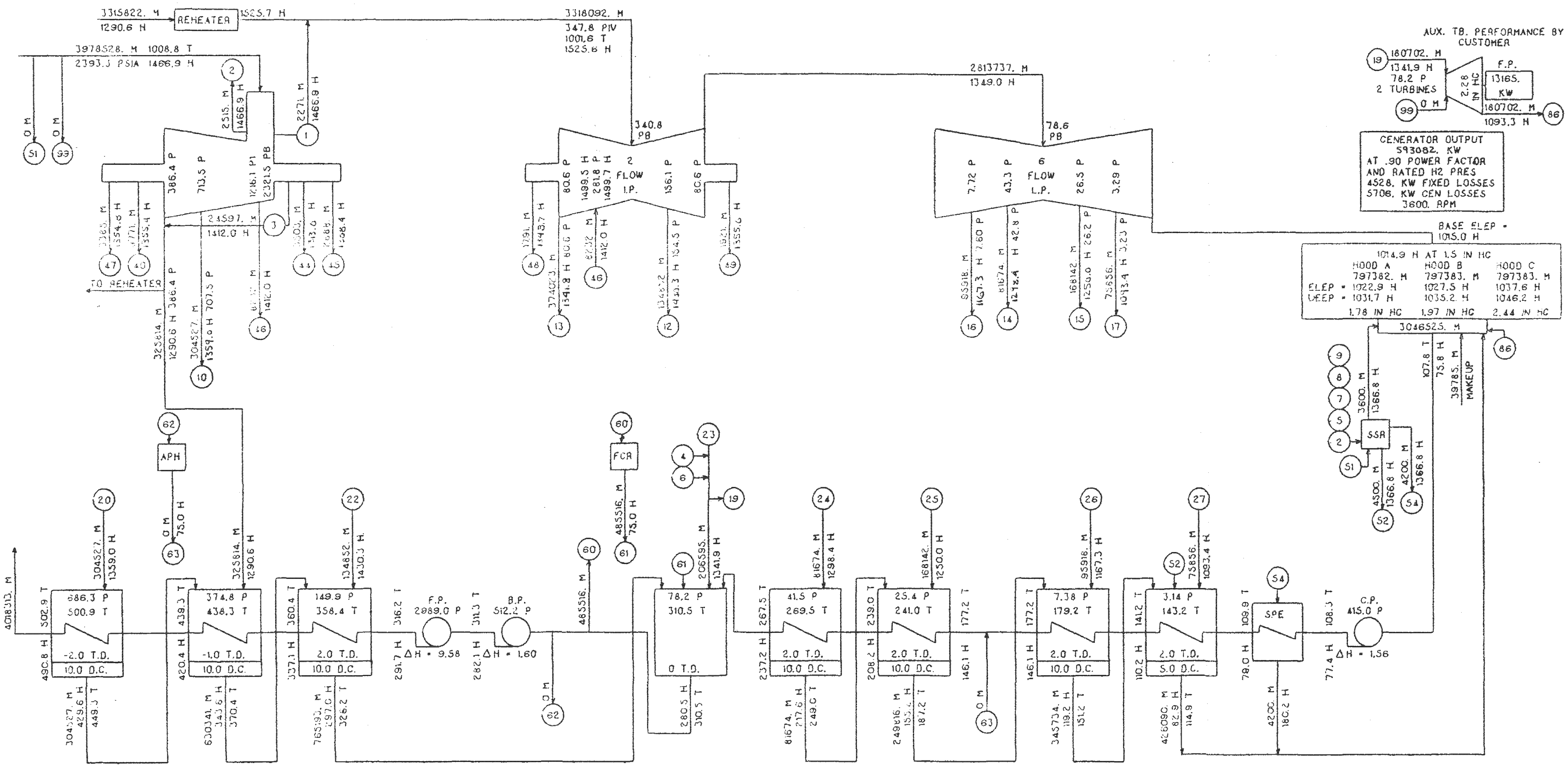
FIG. 9F

FIG. 9G

TURBINE AND EXTRACTION ARRANGEMENT IS SCHEMATIC ONLY

CONTRACT CYCLE HEAT BALANCE TEST No. 9

THE VALUE OF GENERATOR OUTPUT SHOWN ON THIS HEAT BALANCE IS AFTER ALL POWER FOR EXCITATION AND OTHER TURBINE-GENERATOR AUXILIARIES HAS BEEN DEDUCTED.



3978.5 (719.5 - 490.8)
+ 3046525. (1.56)
+ 3978528. (1466.9 - 490.8)

$$\text{VALVE BEST POINT NET HEAT RATE} = \frac{+\ 3315822.\ (\ 1525.7 - 1290.6\ )}{593082.} = 7872.3\ \frac{\text{BTU}}{\text{KW-HR}}$$

LEGEND - CALCULATIONS BASED ON 1967 ASME STEAM TABLES
M - FLOW-LB/HR
P - PRESSURE-PSIA
H - ENTHALPY-BTU/LB
T - TEMPERATURE-F DEGREES

9799T 1 0 1

KW / / IN HG ABS.
CONTRACT CYCLE HEAT BALANCE TEST NO.9
TC6F 30.0 IN. LSB 3600 RPM
2400.0 PSIA 1000. / 1000. T
GEN- 991000. KVA .90 PF LIQ

GENERAL ELECTRIC COMPANY, SCHENECTADY N.Y.

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FIG. 9G

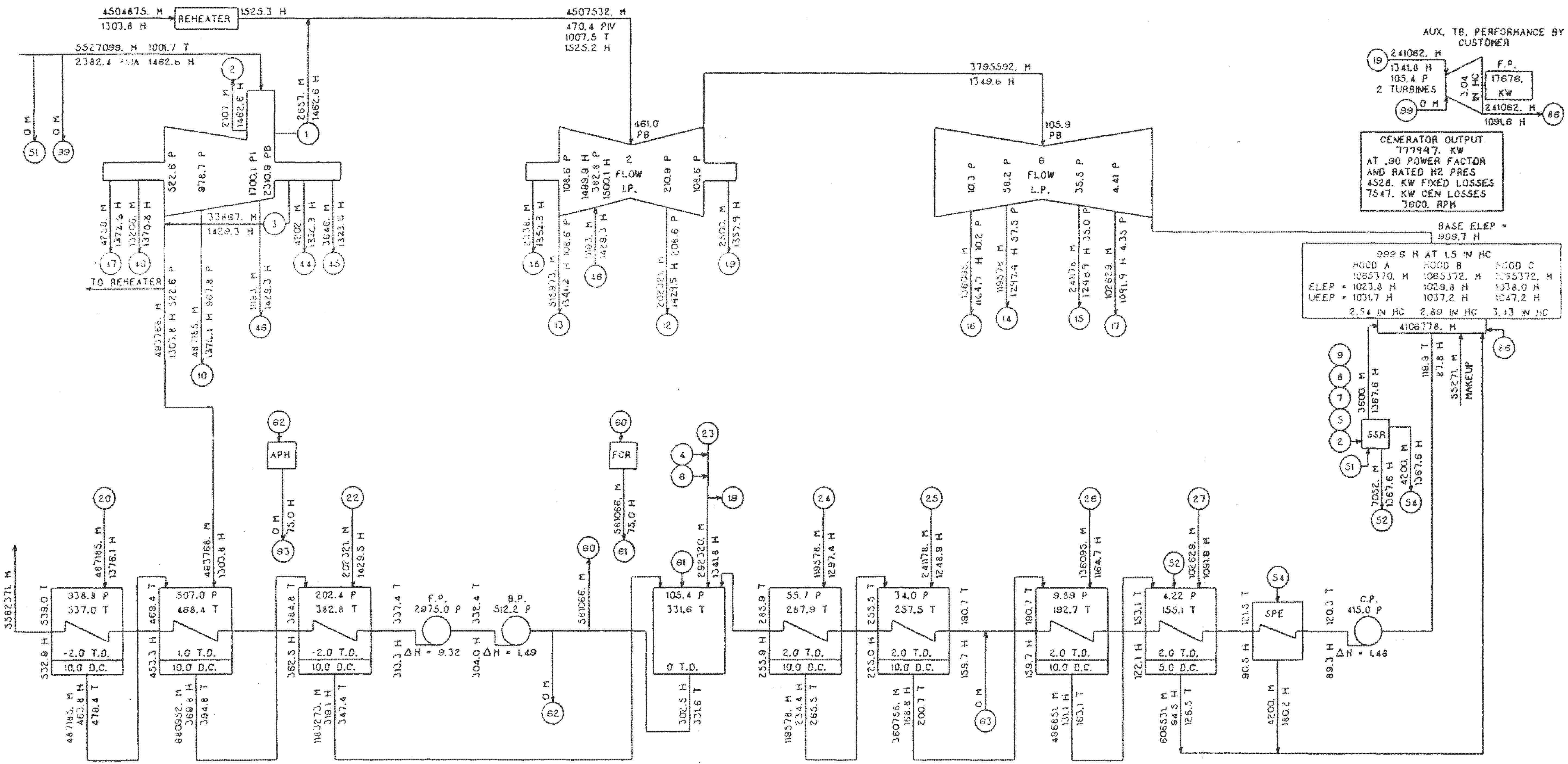
IP14_005073

FIG. 9H

TURBINE AND EXTRACTION ARRANGEMENT IS SCHEMATIC ONLY

CONTRACT CYCLE HEAT BALANCE TEST No. 10

THE VALUE OF GENERATOR OUTPUT SHOWN ON THIS HEAT BALANCE IS AFTER ALL POWER FOR EXCITATION AND OTHER TURBINE-GENERATOR AUXILIARIES HAS BEEN DEDUCTED.



VALUE BEST POINT NET HEAT RATE = $\dfrac{4106778.(1.48) + 5527.1(718.2 - 532.9) + 5527099.(1462.6 - 532.9) + 4504875.(1525.3 - 1303.8)}{777947.}$ = 7897.2 BTU/KW-HR

LEGEND - CALCULATIONS BASED ON 1967 ASME STEAM TABLES
M - FLOW-LB/HR
P - PRESSURE-PSIA
H - ENTHALPY-BTU/LB
T - TEMPERATURE-F DEGREES

9624T 1 0 1

KW / / IN HC ABS.
CONTRACT CYCLE HEAT BALANCE TEST NO.10
TC6F 30.0 IN. LSB 3600 RPM
2400.0 PSIA 1000. / 1000. T
GEN- 991000. KVA .90 PF LIQ

GENERAL ELECTRIC COMPANY, SCHENECTADY N.Y.

5/14/87
Fig. 9H

IP14_005074

INTERMOUNTAIN POWER CO.

Unit No. 2 T 151

High Pressure Section Efficiency

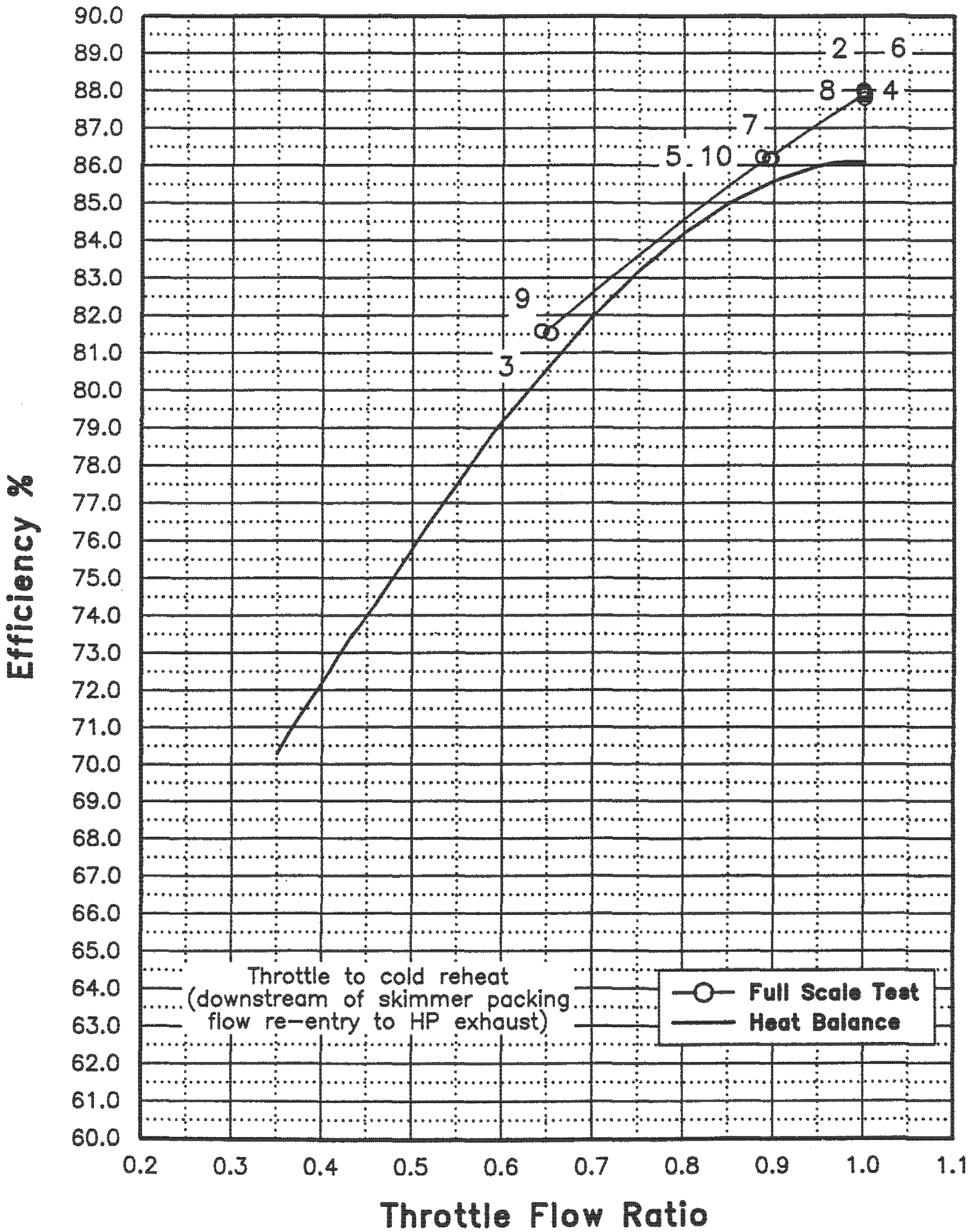


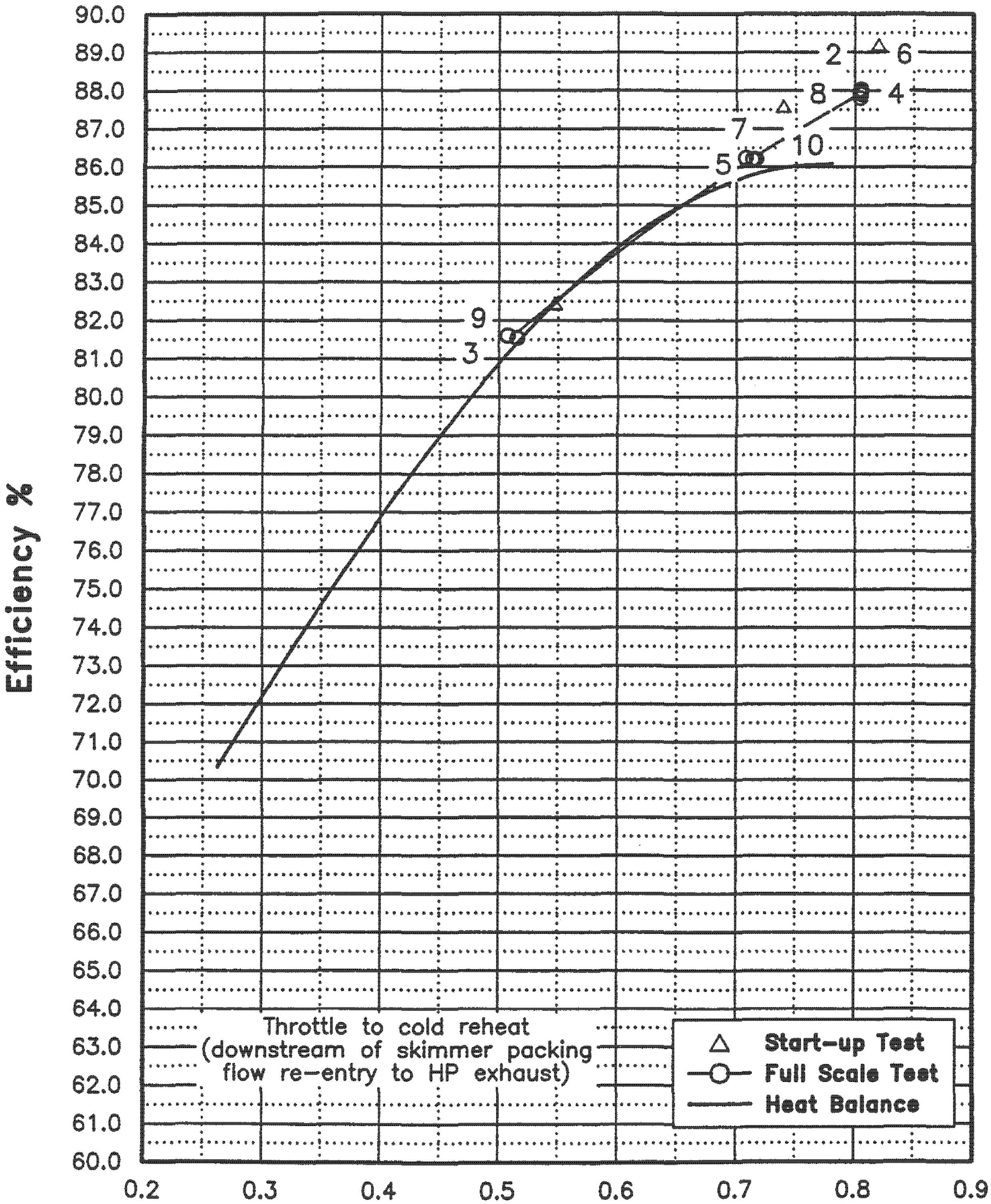
Figure 10

IP14_005075

INTERMOUNTAIN POWER CO.

Unit No. 2 T 151

High Pressure Section Efficiency



First Stage Pressure/Throttle Pressure

Figure 11

INTERMOUNTAIN POWER CO.

Unit No. 2 T 151

Intermediate Pressure Section Efficiency

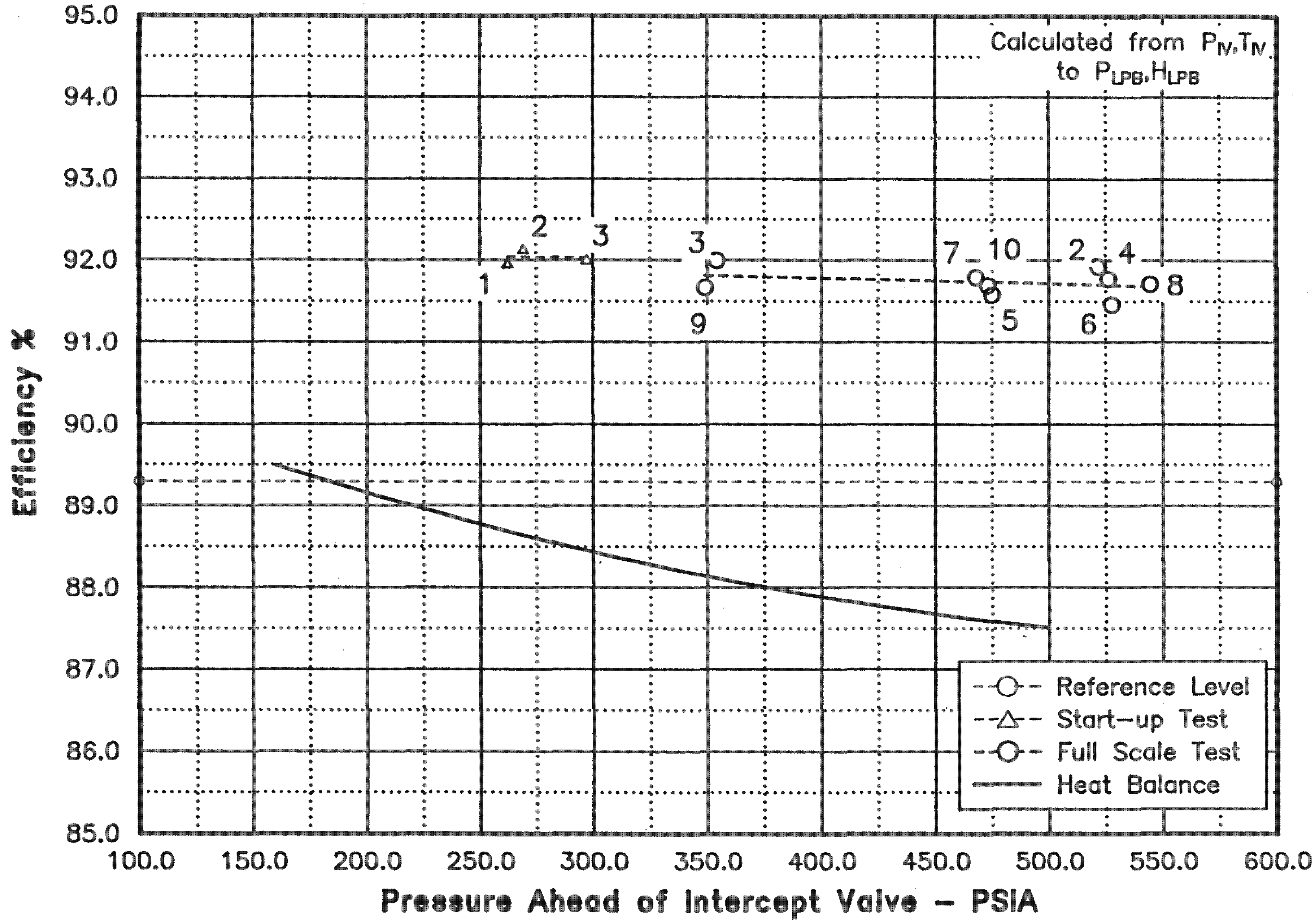


Fig. 12

Figure 12

IP14_005077

INTERMOUNTAIN POWER CO.

IPP No. 2

Reheat Steam Path Efficiency to UEEP

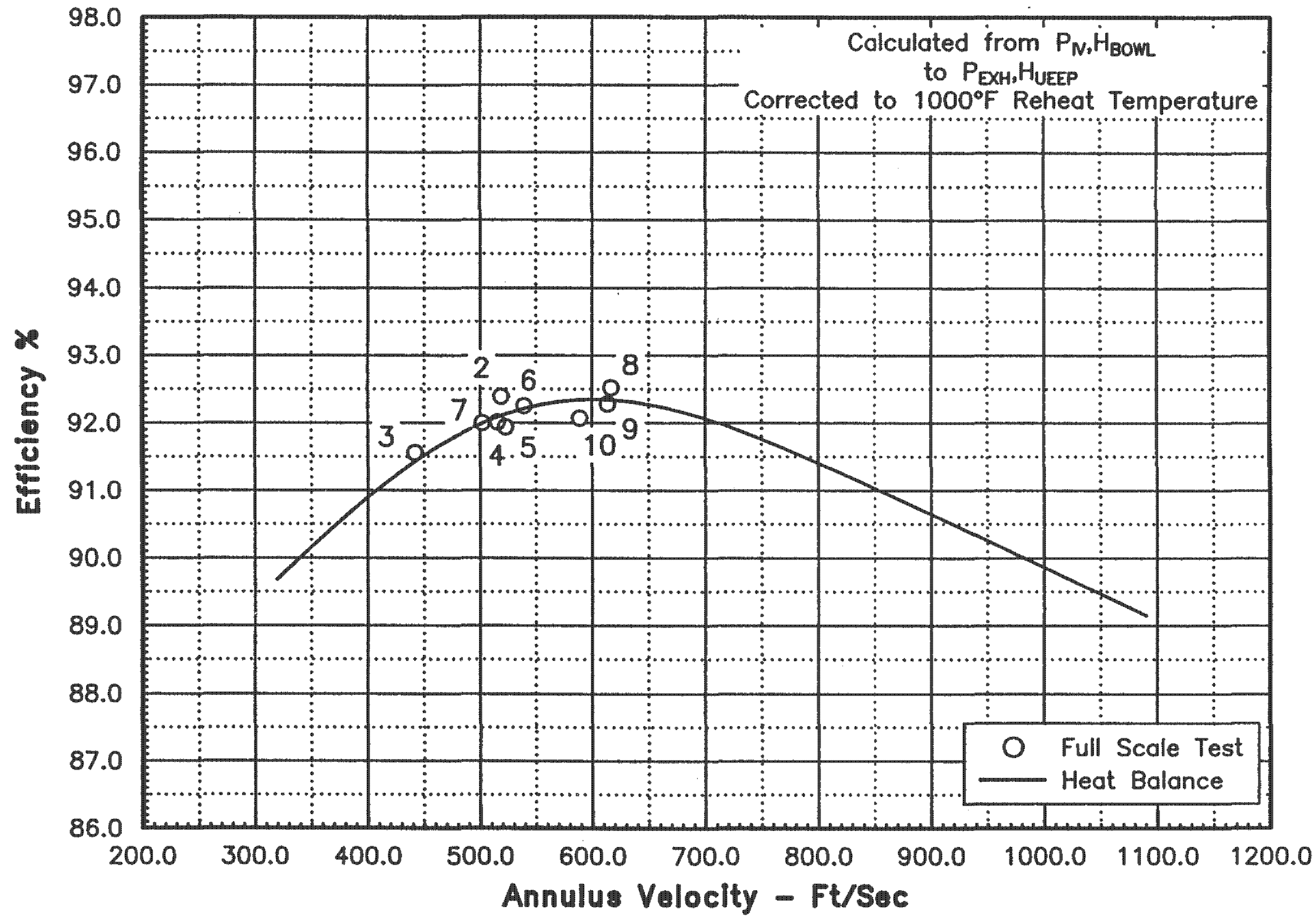


Fig. 13

Figure 13

INTERMOUNTAIN POWER CO.

IPP No. 2

Reheat Steam Path Efficiency to ELEP

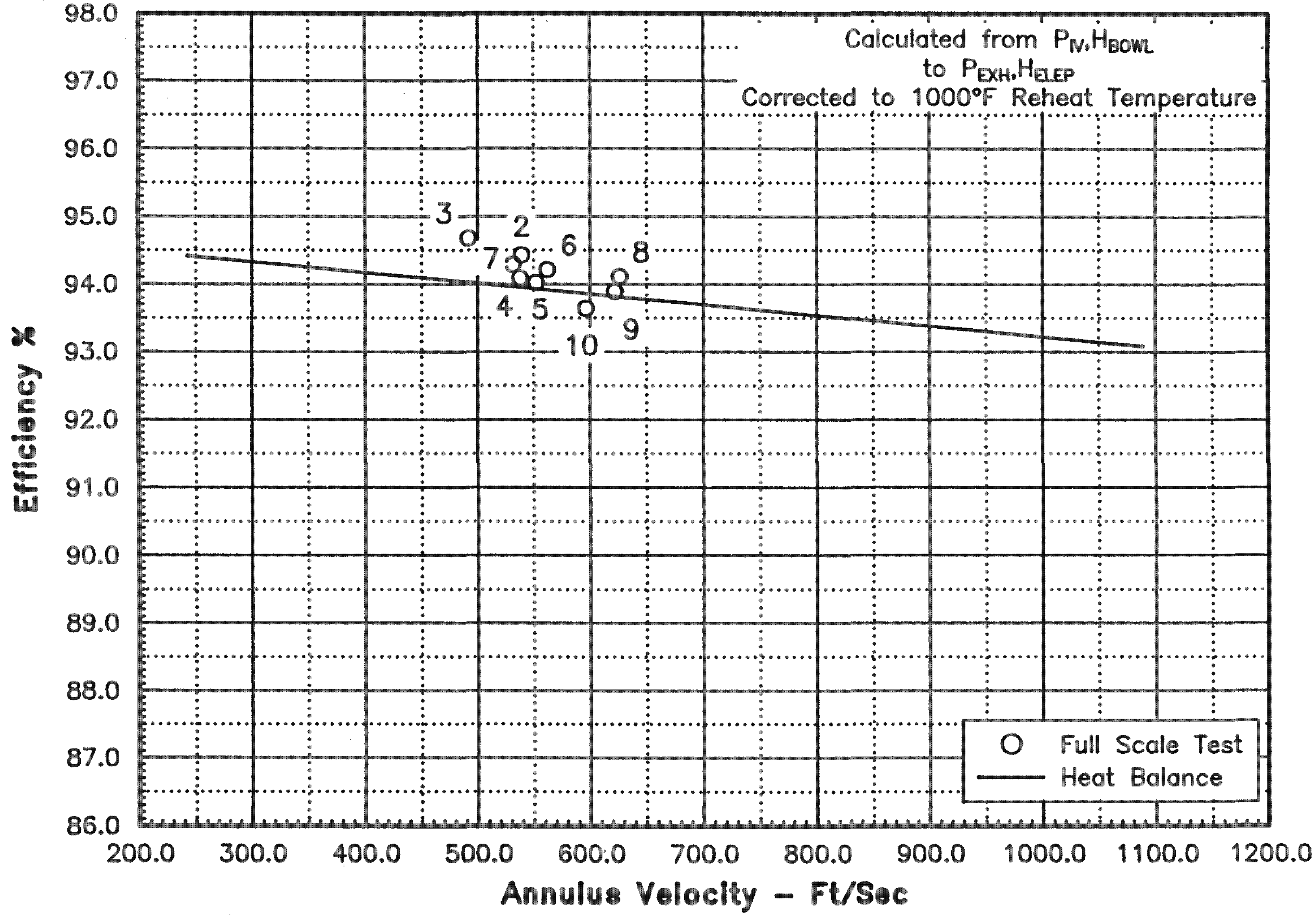


Figure 14

Fig. 14

IP14_005079

INTERMOUNTAIN POWER CO.

Unit No. 2 T 151

Test Heat Rate

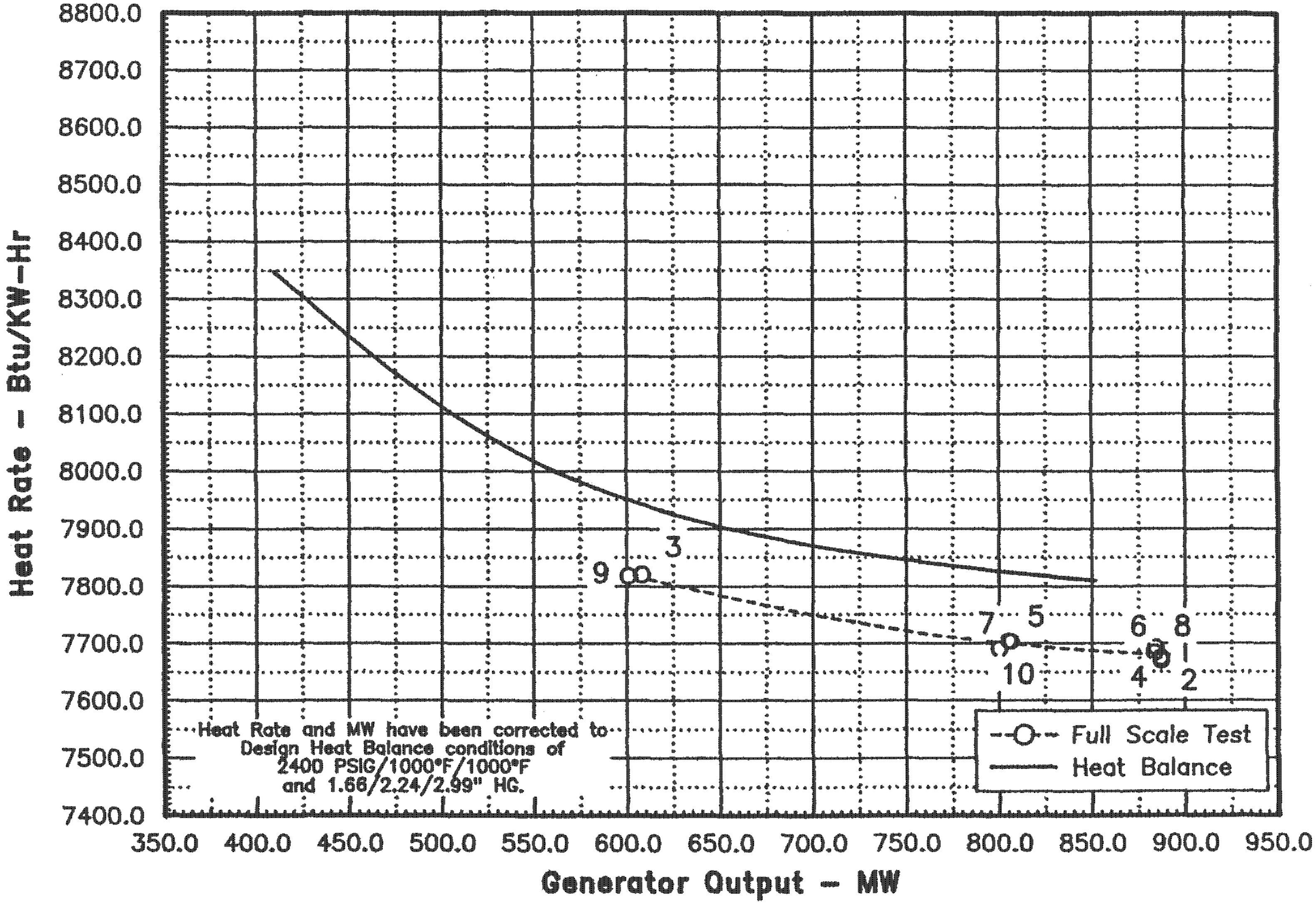


Fig. 15

Figure 15

INTERMOUNTAIN POWER CO.

Unit No. 2 T 151

Contract Cycle Heat Rate

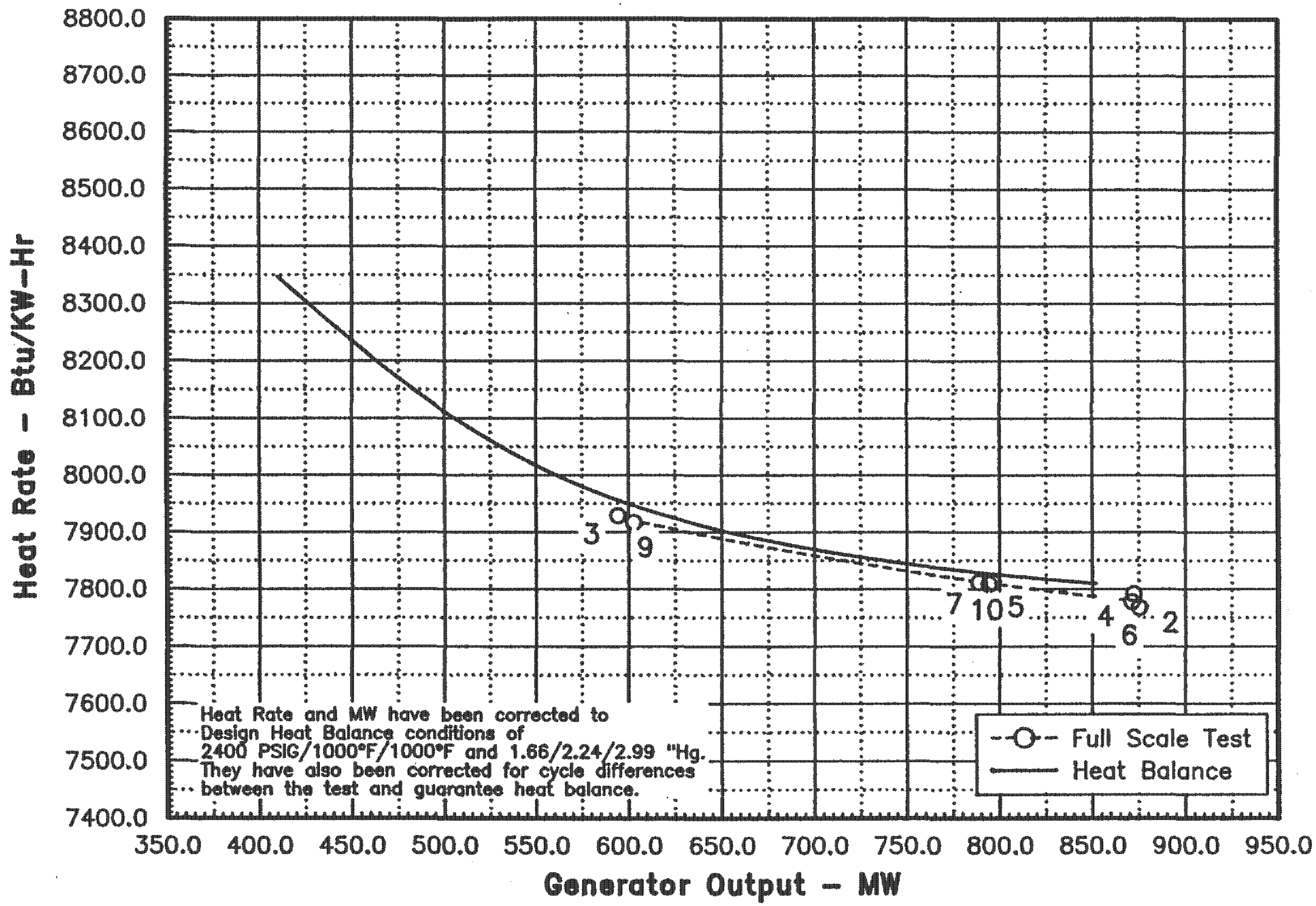


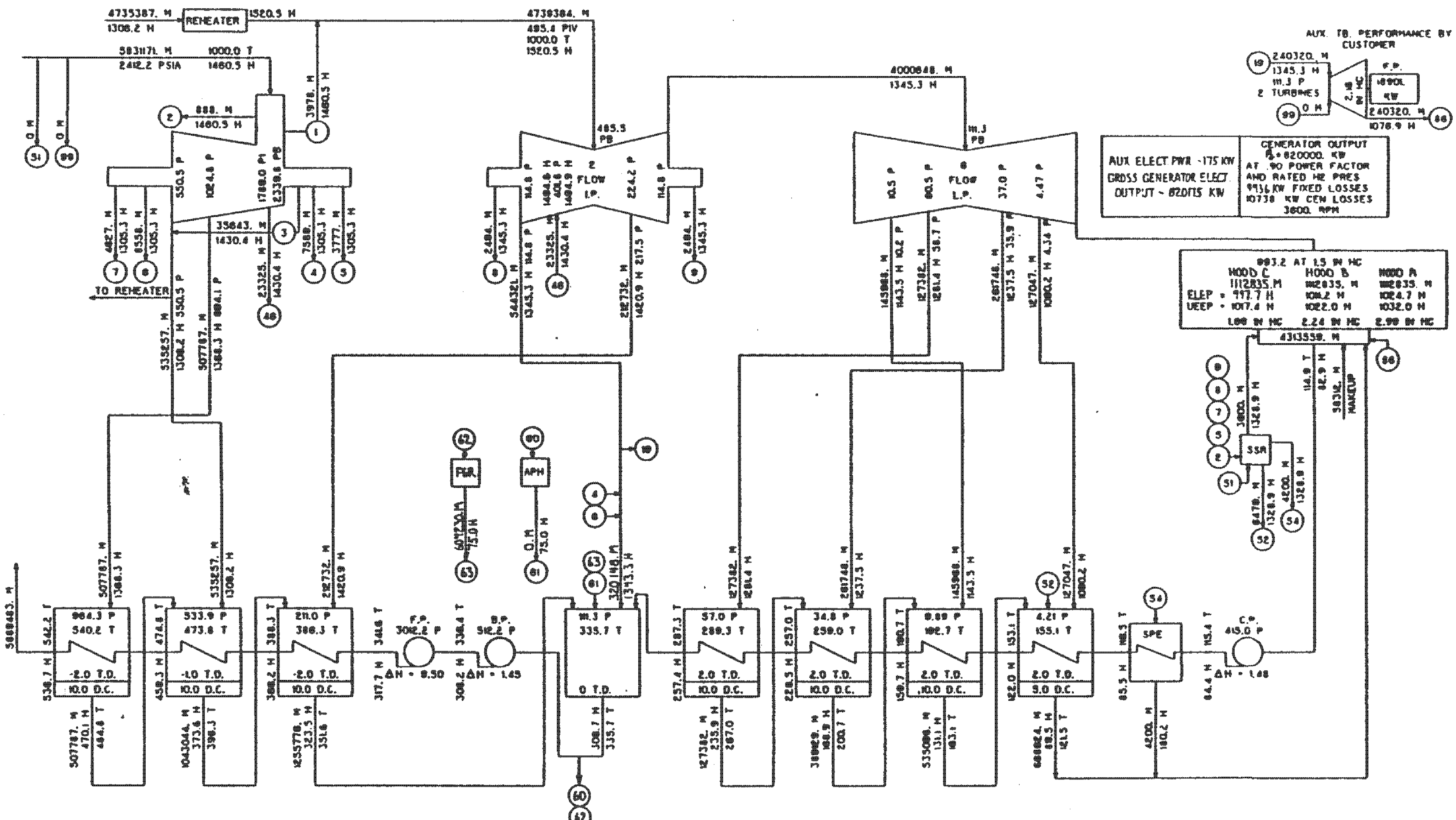
Figure 16

Fig. 16

IP14_005081

481 HB 111

EXTRACTION ARRANGEMENT IS SCHEMATIC ONLY



CUSTOMER DEFINED VALVE BEST POINT NET HEAT RATE = $\frac{5831171.M(1460.5H-536.7H)+4735387.M(1520.5H-1306.2H)+4313559.M(1.48H)+5831.M(720.5H-536.7H)}{820000\ KW}$ = 7816 $\frac{Btu}{Kw\text{-}Hr}$

LEGEND - CALCULATIONS BASED ON 1967 ASME STEAM TABLES
M - FLOW-LB/HR
P - PRESSURE-PSIA
H - ENTHALPY-BTU/LB
T - TEMPERATURE-F DEGREES

820000. KW 1.66 / 2.24 / 2.99 IN HC ABS. 1.00 PCT MU
TC6F 30.0 IN. LSB 3600 RPM
2400 PSIG 1000. / 1000. F
GEN- 991000. KVA .90 PF LIQ

KW Koran

03ICT 1 DBOE91 9523 0 5
481 HB 111 8-24-81

GENERAL ELECTRIC COMPANY, SCHENECTADY N.Y.

Fig. 17A

Fig. 17A

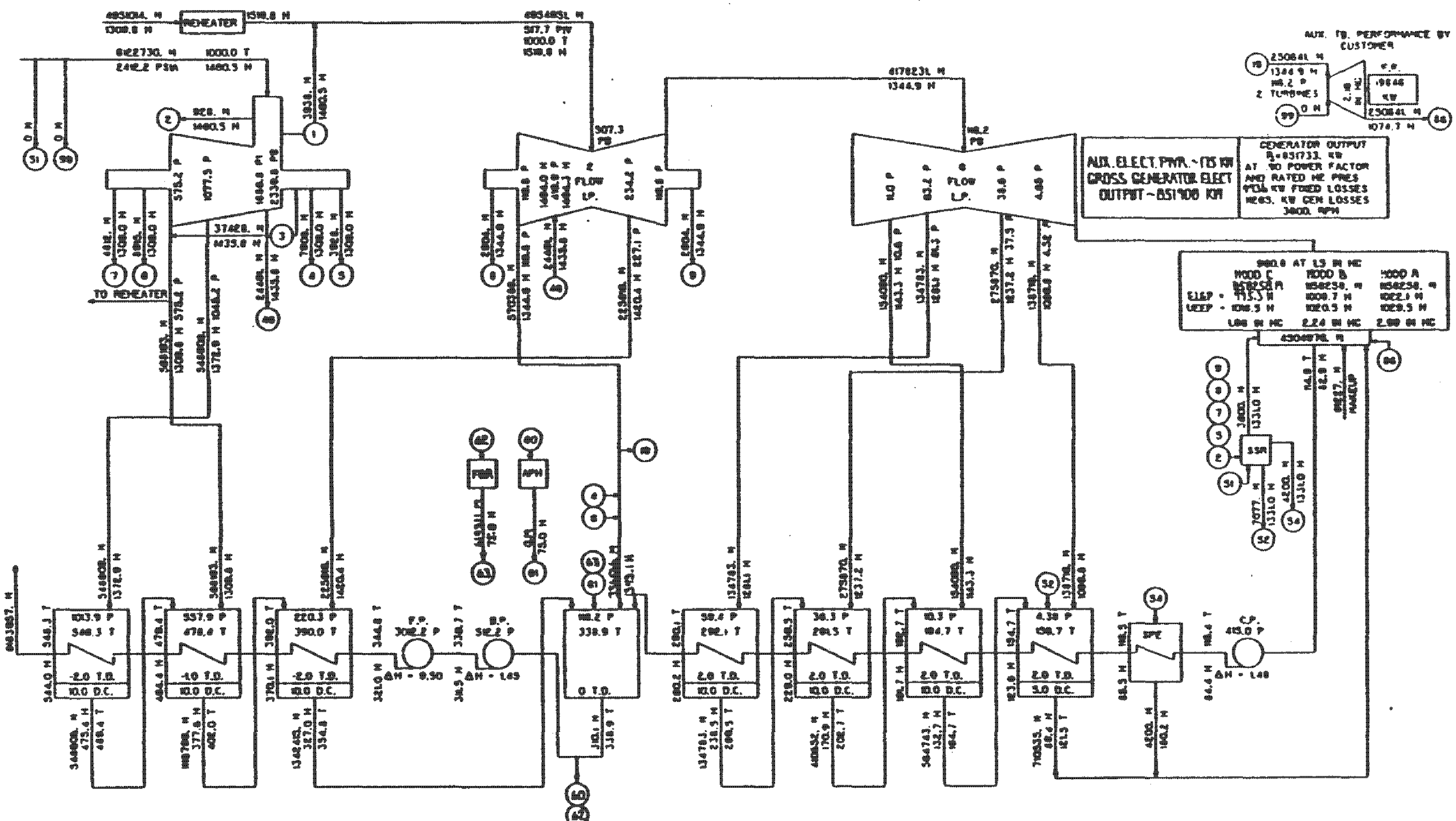
IP14_005082

HB 145

EXTRACTION ARRANGEMENT IS SCHEMATIC ONLY

CALCULATED DATA - NOT GUARANTEED

RATING FLOW IS 583H71. W AT INLET STEAM CONDITIONS OF 2412.2 PSIA AND 1000.0 T
TO ASSURE THAT THE TURBINE WILL PASS THIS FLOW, CONSIDERING VARIATIONS IN FLOW COEFFICIENTS
FROM EXPECTED VALUES, SHOP TOLERANCES ON OPERATING AREAS, ETC WHICH MAY AFFECT THE FLOW, THE
TURBINE IS BEING DESIGNED FOR A DESIGN FLOW RATING FLOW PLUS 5.0 PERCENT OF 6122730. W



CUSTOMER DEFINED
VALVE BEST POINT = 6122730.M(1460.5H-544.0H)+4951014.M(1519.8H-1309.8H)+4504976.M(1.48H)+6123.M(720.5H-544.0H) / 851733 KW = 7818 BTU/KW/HR
NET HEAT RATE

LEGEND - CALCULATIONS BASED
ON 1967 ASME STEAM TABLES
W - FLOW-LB/HR
P - PRESSURE-PSIA
H - ENTHALPY-BTU/LB
T - TEMPERATURE-F DEGREES

820000. KW 1.68 / 2.24 / 2.98 IN HG ABS 1.00 PCT MU
TC6F 30.0 IN LSB 3600 RPM
2400 PSIG 1000 / 1000 F
GEN- 991000 KVA 90 PF L10

KW Koran

534AT 1 DBOE91 0 G 8
481 HB 145 7-17-01

GENERAL ELECTRIC COMPANY, SCHENECTADY N.Y.

Fig. 17B

IP14_005083

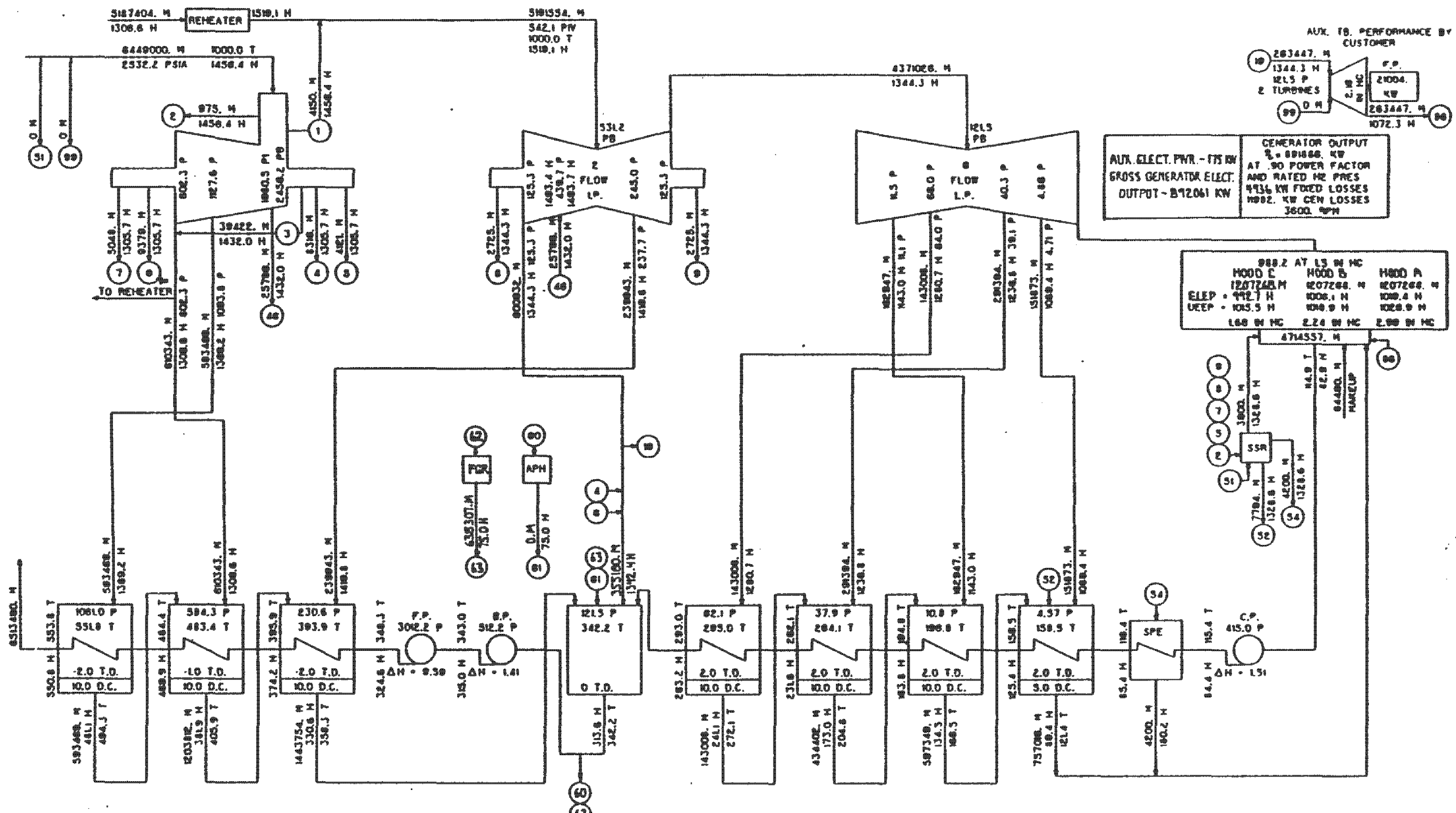
Fig. 17B

481 HB 112

EXTRACTION ARRANGEMENT IS SCHEMATIC ONLY

CALCULATED DATA - NOT GUARANTEED

RATING FLOW IS 5831871. M AT INLET STEAM CONDITIONS OF 2412.2 PSIA AND 1000.0 T
TO ASSURE THAT THE TURBINE WILL PASS THIS FLOW, CONSIDERING VARIATIONS IN FLOW COEFFICIENTS
FROM EXPECTED VALUES, SHOP TOLERANCES ON DRAWING AREAS, ETC. WHICH MAY AFFECT THE FLOW, THE
TURBINE IS BEING DESIGNED FOR A DESIGN FLOW (RATING FLOW PLUS 5.0 PERCENT) OF 6122730. M
THE EQUIVALENT DESIGN FLOW AT 2532.2 PSIA AND 1000.0 T IS 6449000. M .



CUSTOMER DEFINED VALVE BEST POINT NET HEAT RATE = $\frac{6449000.M(1456.4H-550.8H)+5187404.M(1519.1H-1306.6H)+4714557.M(1.51H)+6449.M(720.5H-550.8H)}{891886\ KW}$ = 7793 $\frac{Btu}{Kw\text{-}Hr}$

LEGEND CALCULATIONS BASED ON 1967 ASME STEAM TABLES
M - FLOW-LB/HR
P - PRESSURE-PSIA
H - ENTHALPY-BTU/LB
T - TEMPERATURE-F DEGREES

820000. KW 1.68 / 2.24 / 2.98 IN HC ABS. 1.00 PCT MU
TC6F 30.0 IN. LSB 3600 RPM
2400 PSIG 1000. / 1000. T
GEN- 991000. KVA .90 PF LIQ

Kew Koran

Fig. 17C

03ICT 1 D802E01 0 0 12
481 HB 112

8-24-81

GENERAL ELECTRIC COMPANY SCHENECTADY N.Y.

IP14_005084

Fig. 17C

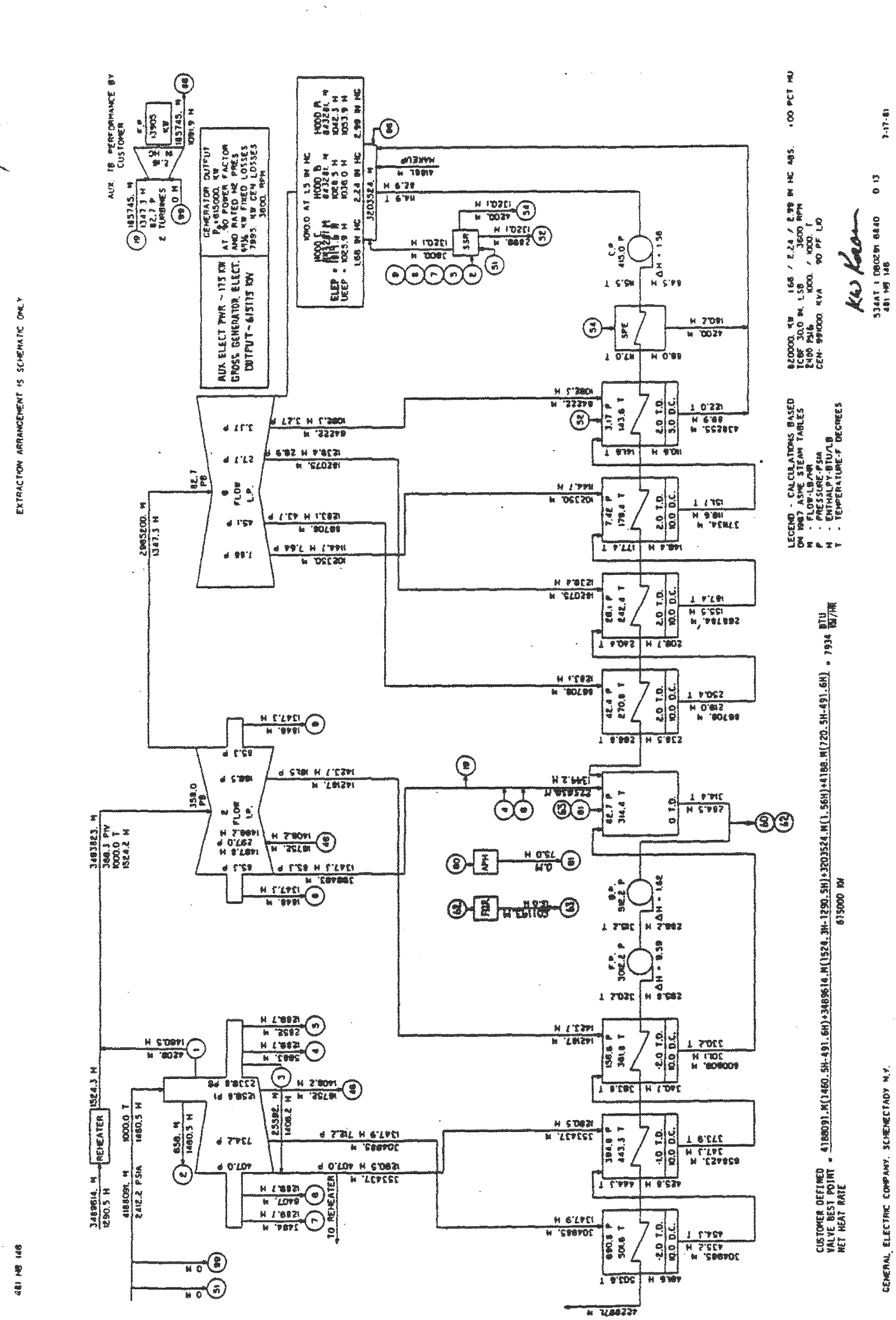


Fig. 17D

Fig. 17D

IP14_005085

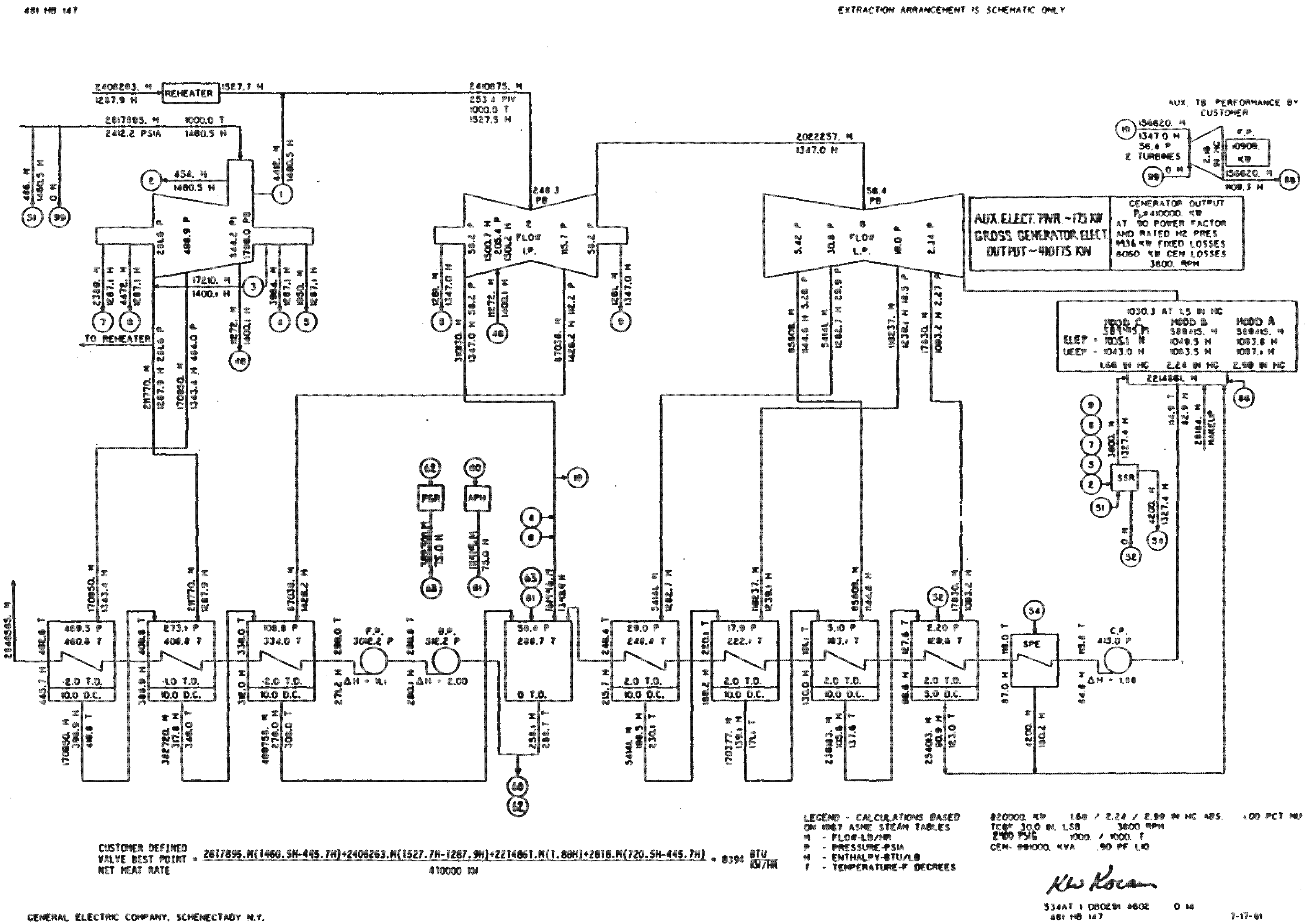


Fig. 17E

Fig. 17E

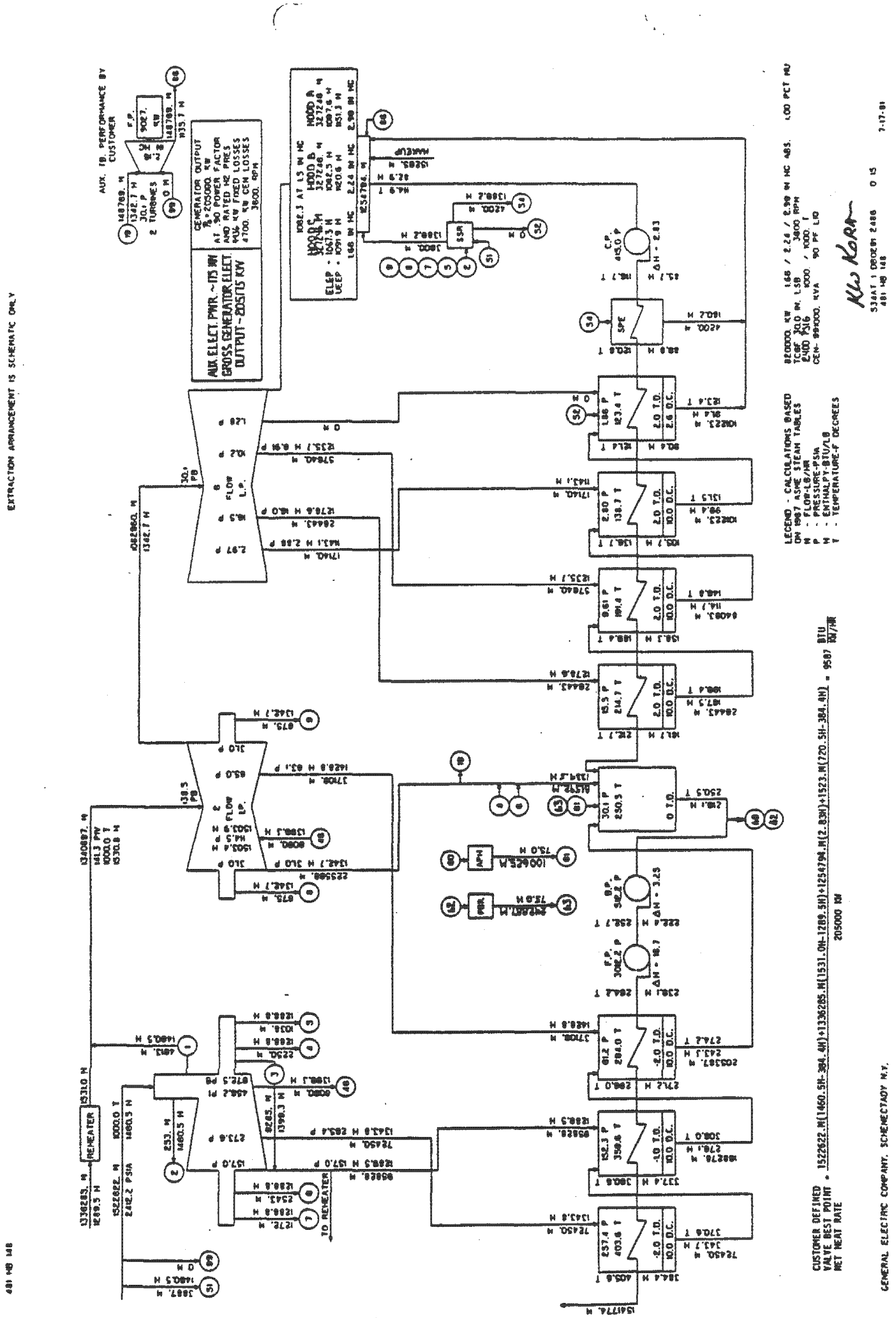


Fig. 17F

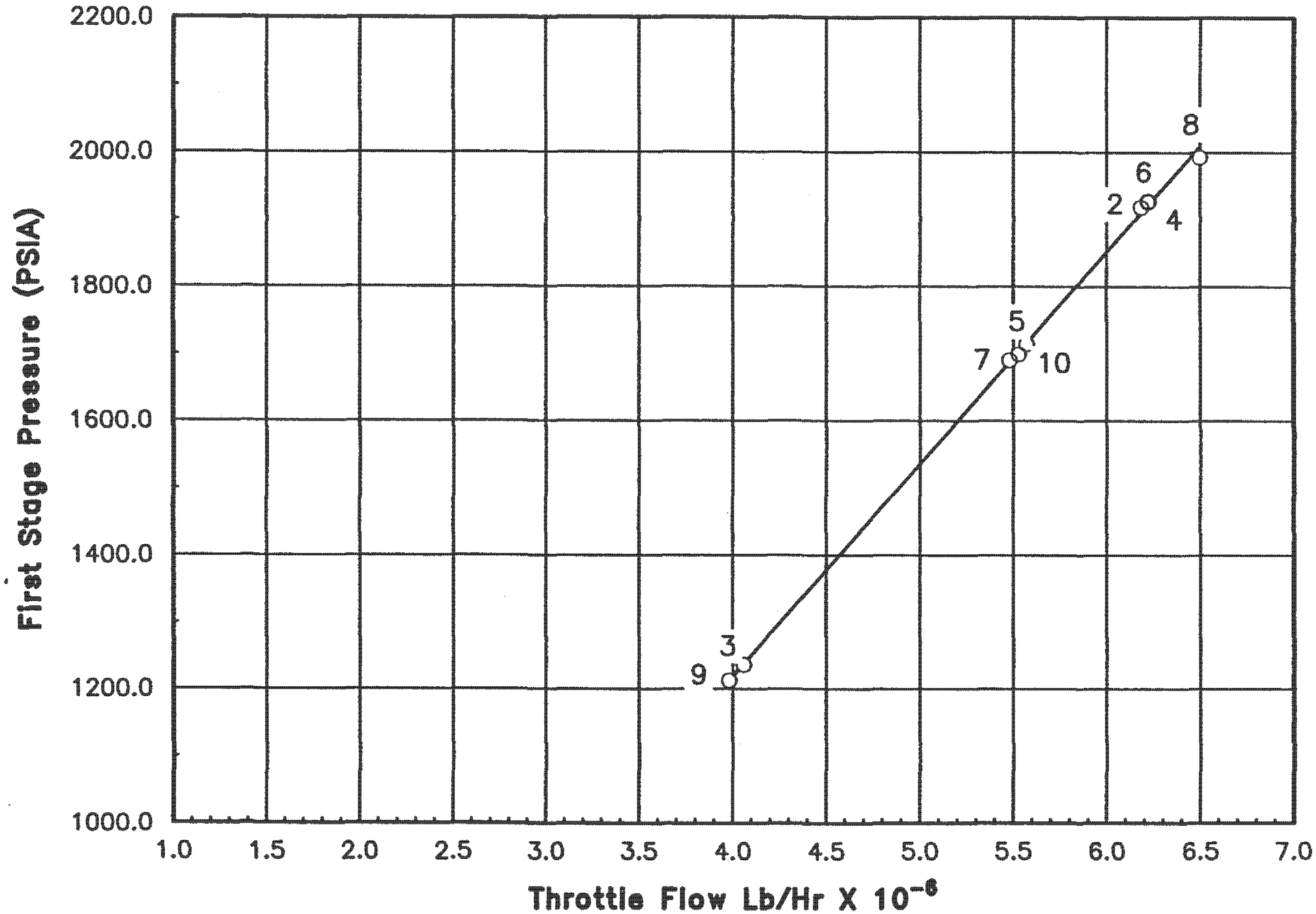
FIG. 17F

IP14_005087

INTERMOUNTAIN POWER CO.

Unit No. 2 T 151

1st Stage Pressure



IP14_005088

Fig. 18

Figure 18

INTERMOUNTAIN POWER CO.

IPP No. 2

First Stage Flow Function

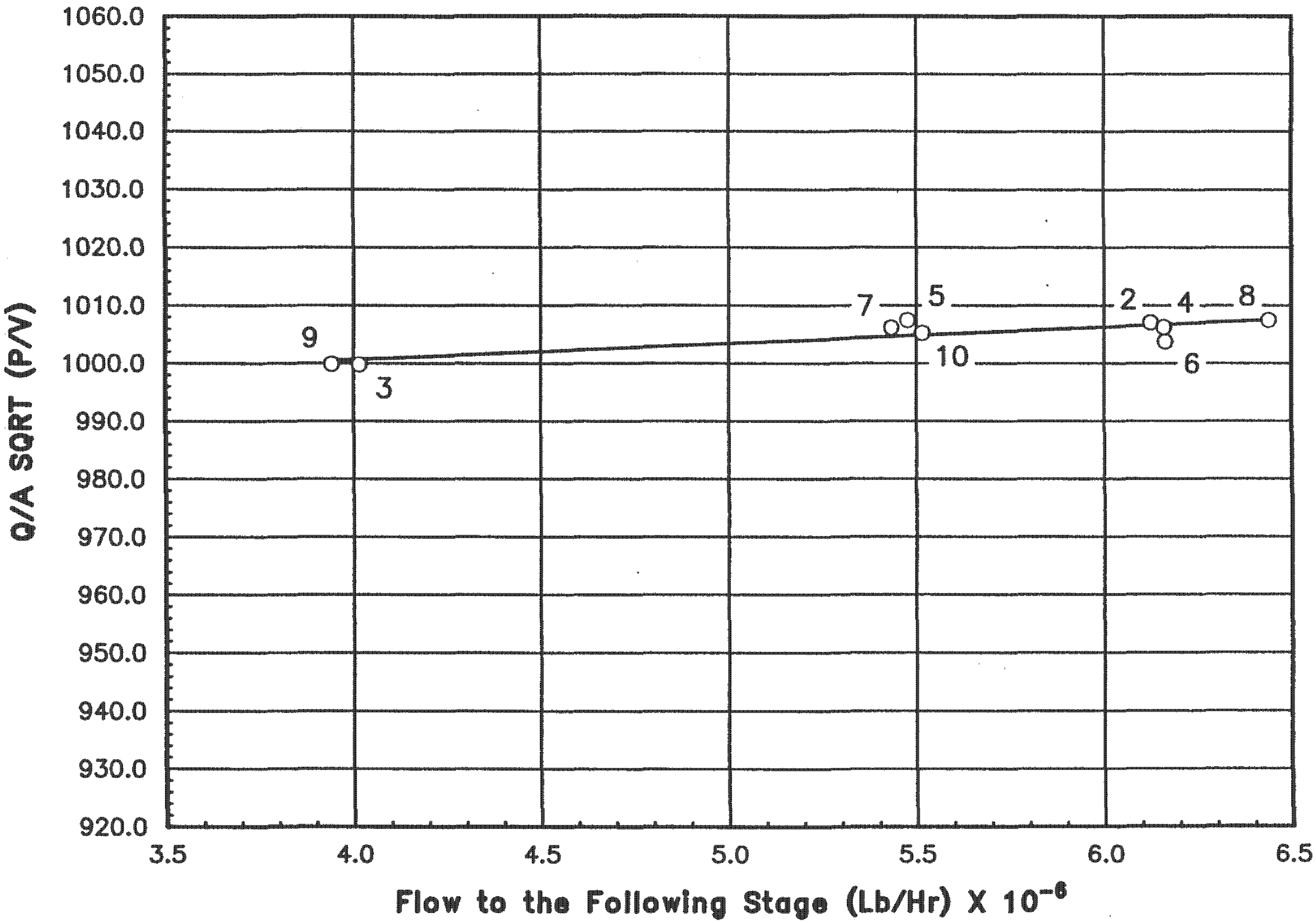


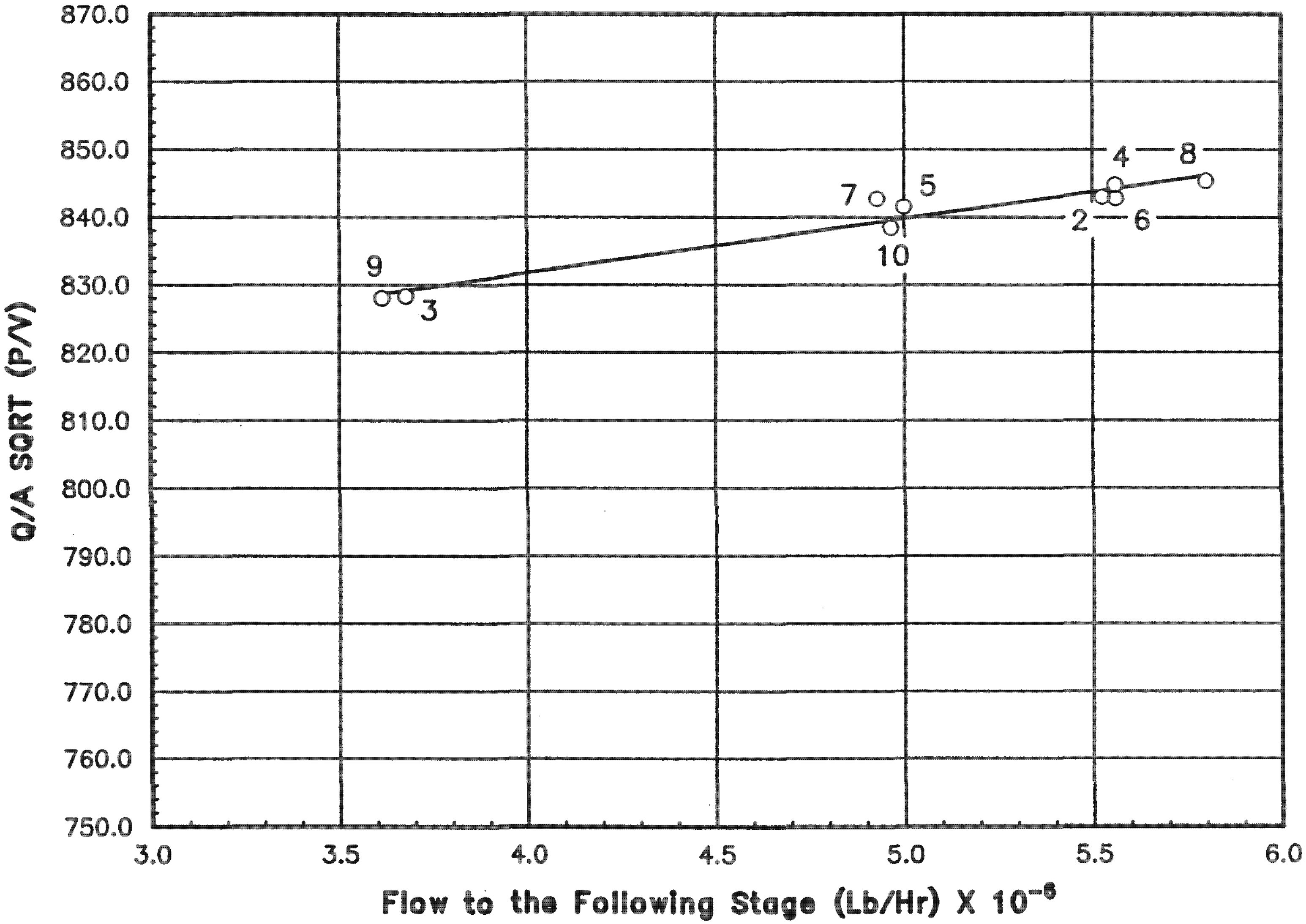
Figure 19

Fig. 19

INTERMOUNTAIN POWER CO.

IPP No. 2

4th Stage Flow Function



IP14_005090

Fig. 20

Figure 20

INTERMOUNTAIN POWER CO.

IPP No. 2

Hot Reheat Flow Function

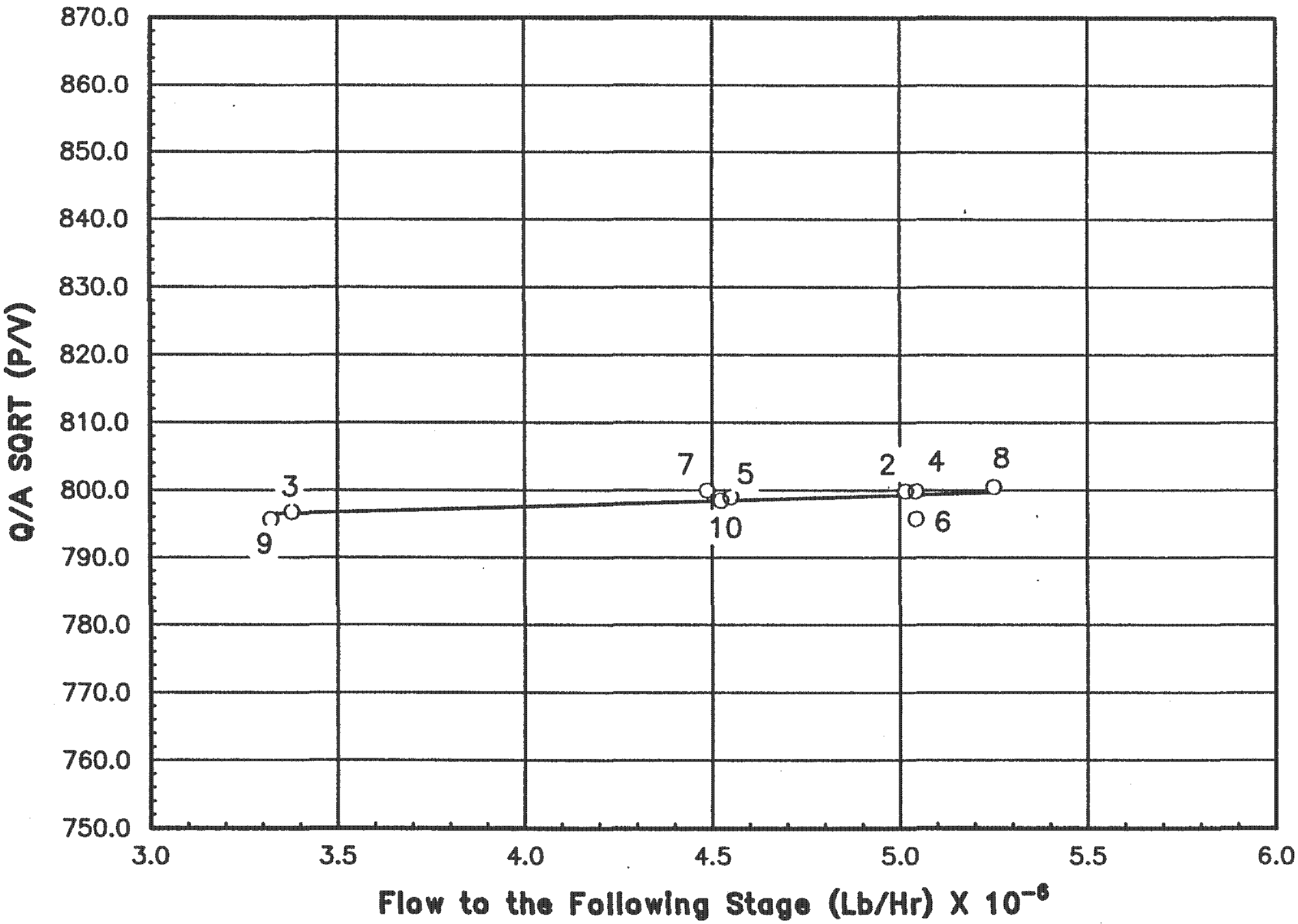


Fig. 21

Figure 21

INTERMOUNTAIN POWER CO.

IPP No. 2

Reheat Bowl Flow Function

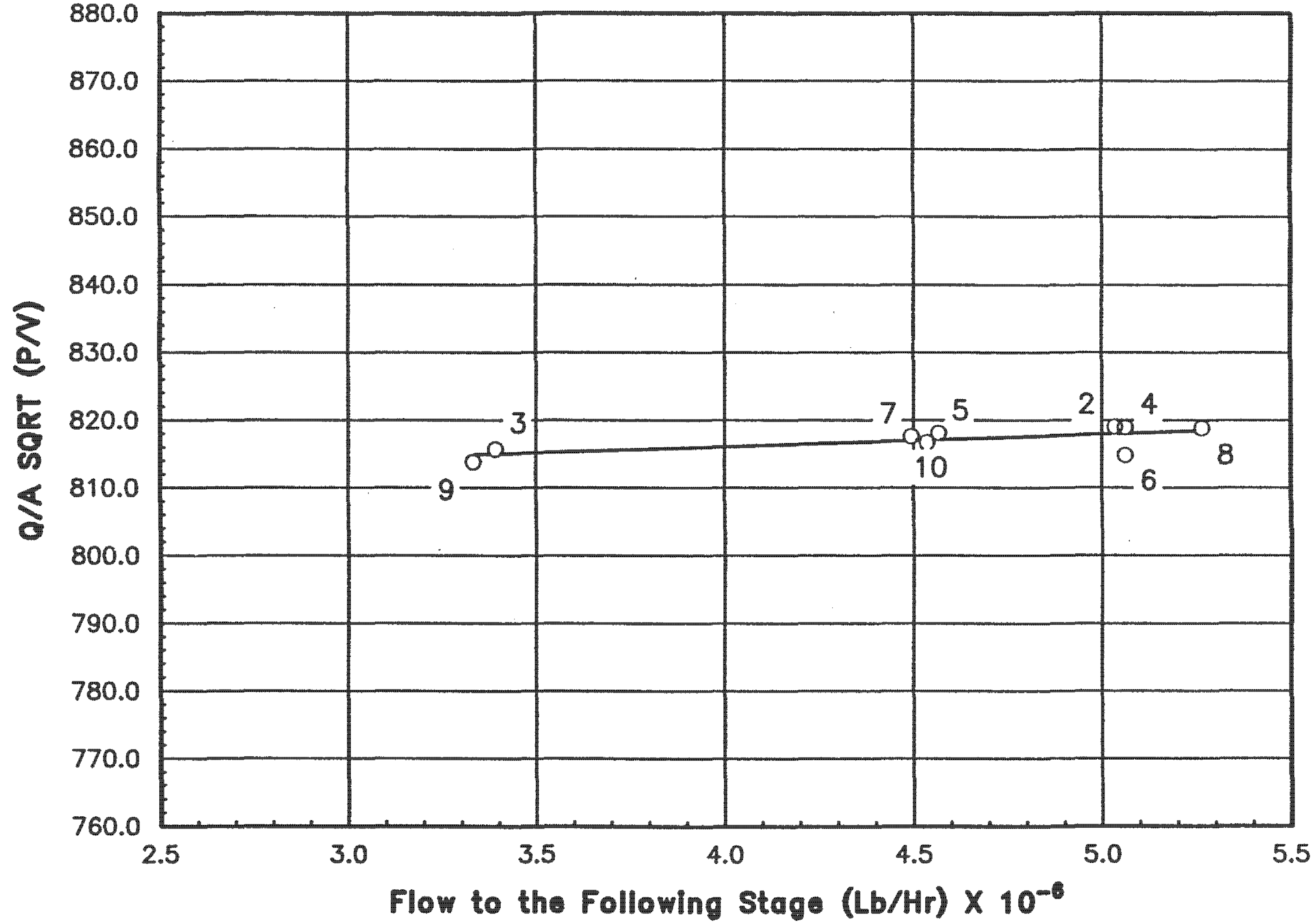


Fig. 22

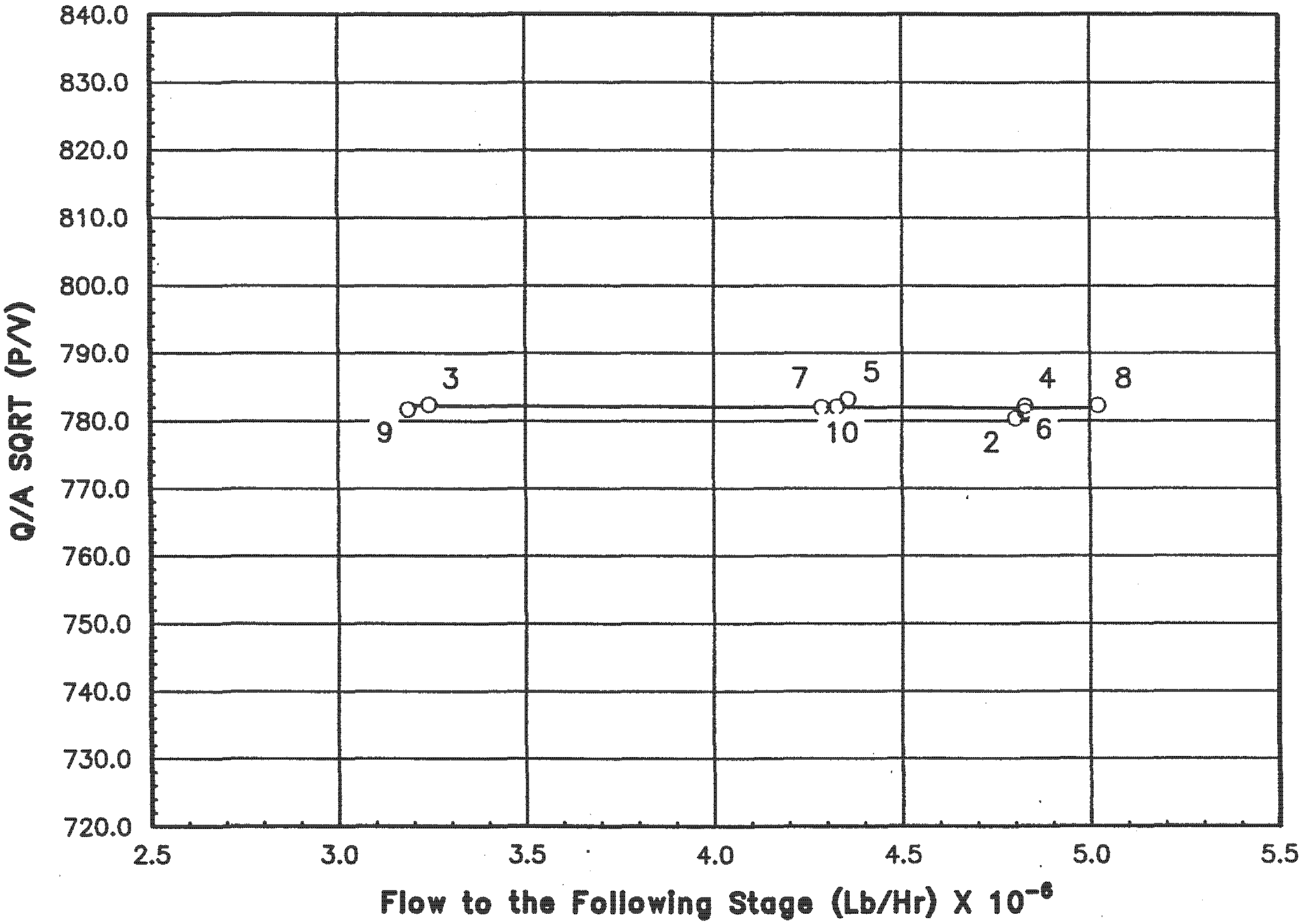
IP14_005092

Figure 22

INTERMOUNTAIN POWER CO.

IPP No. 2

11th Stage Flow Function



IP14_005093

Fig. 23

Figure 23

INTERMOUNTAIN POWER CO.

IPP No. 2

Low Pressure Bowl Flow Function

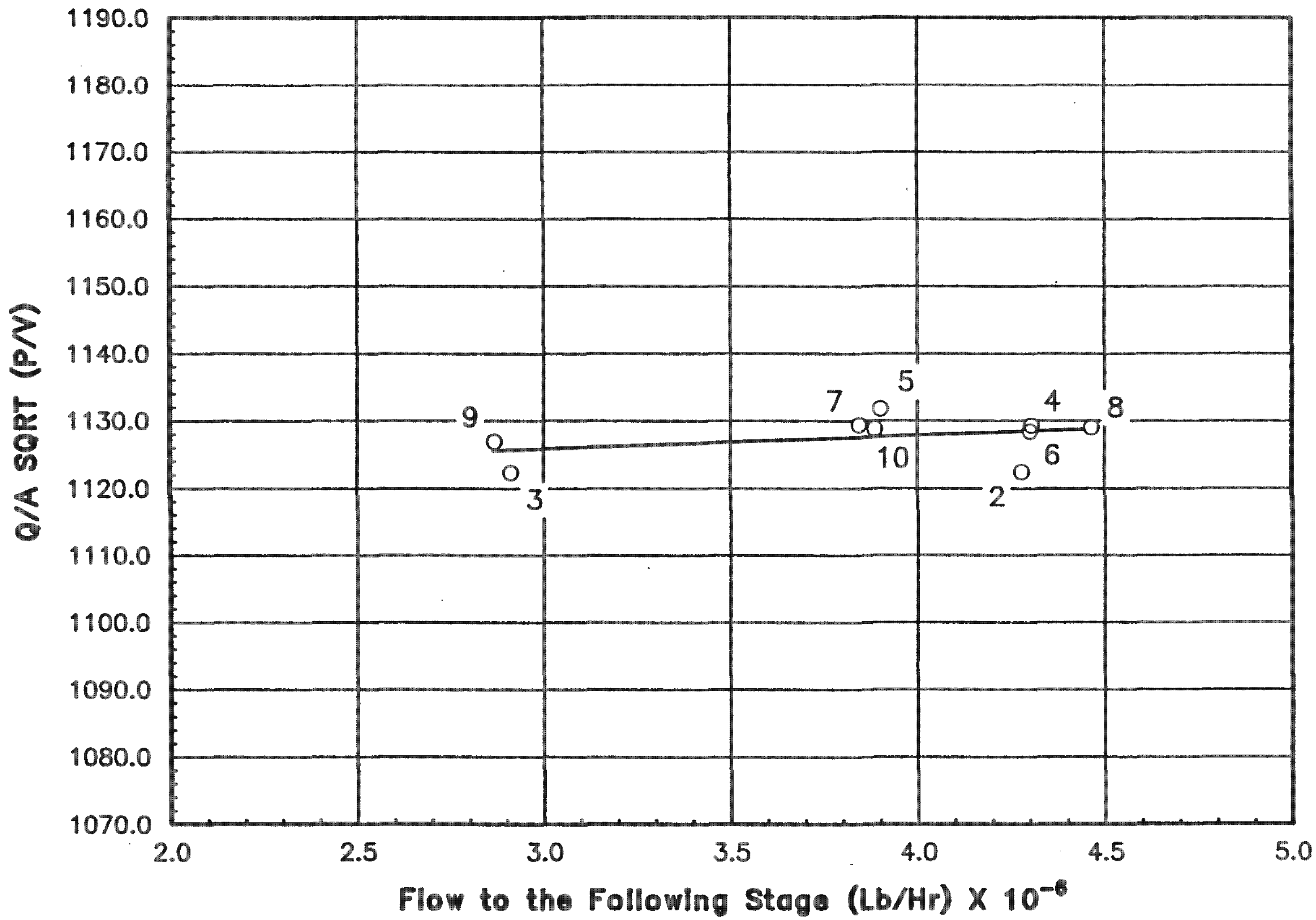


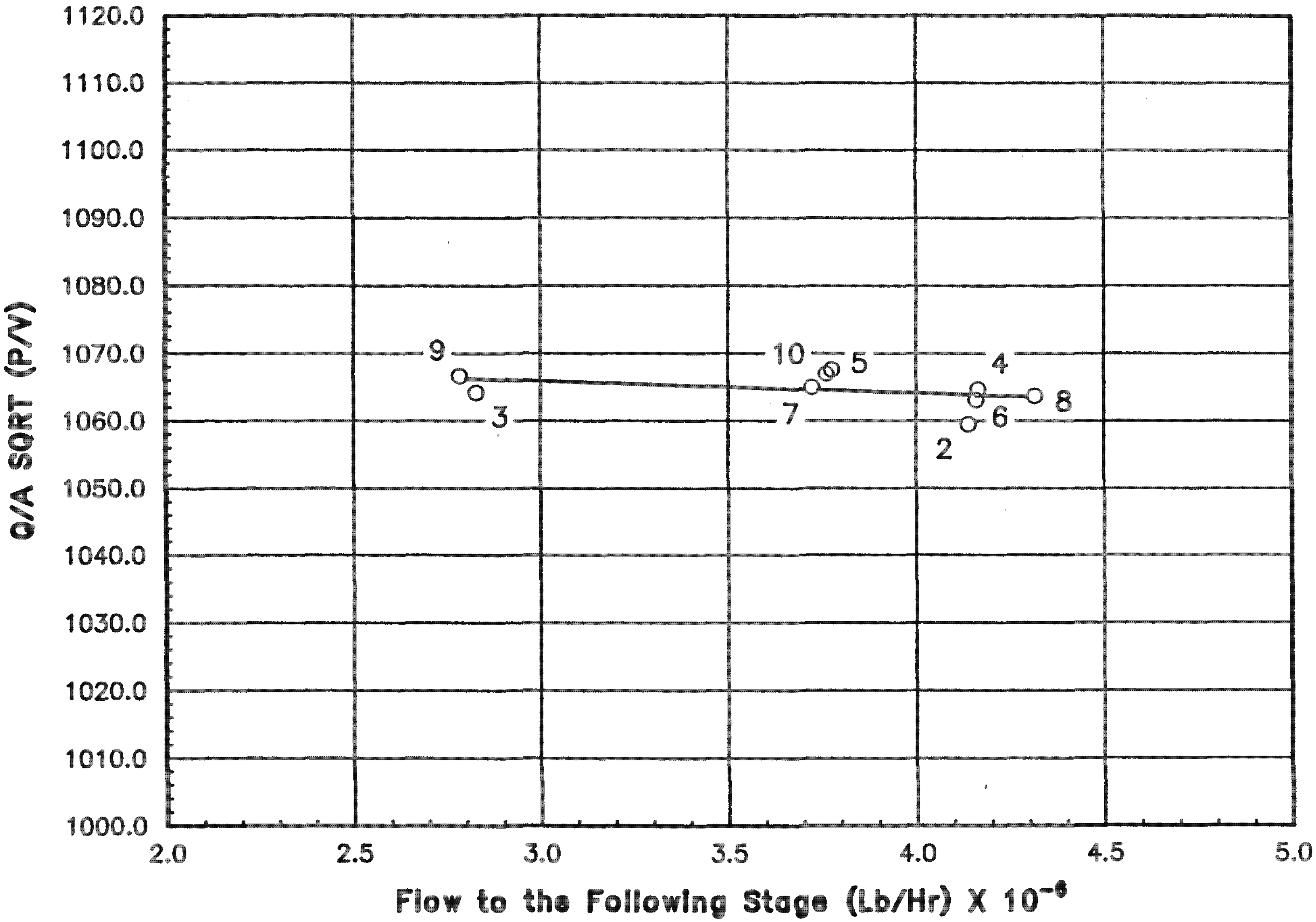
Figure 24

Fig. 24

INTERMOUNTAIN POWER CO.

IPP No. 2

15th Stage Flow Function



IP14_005095

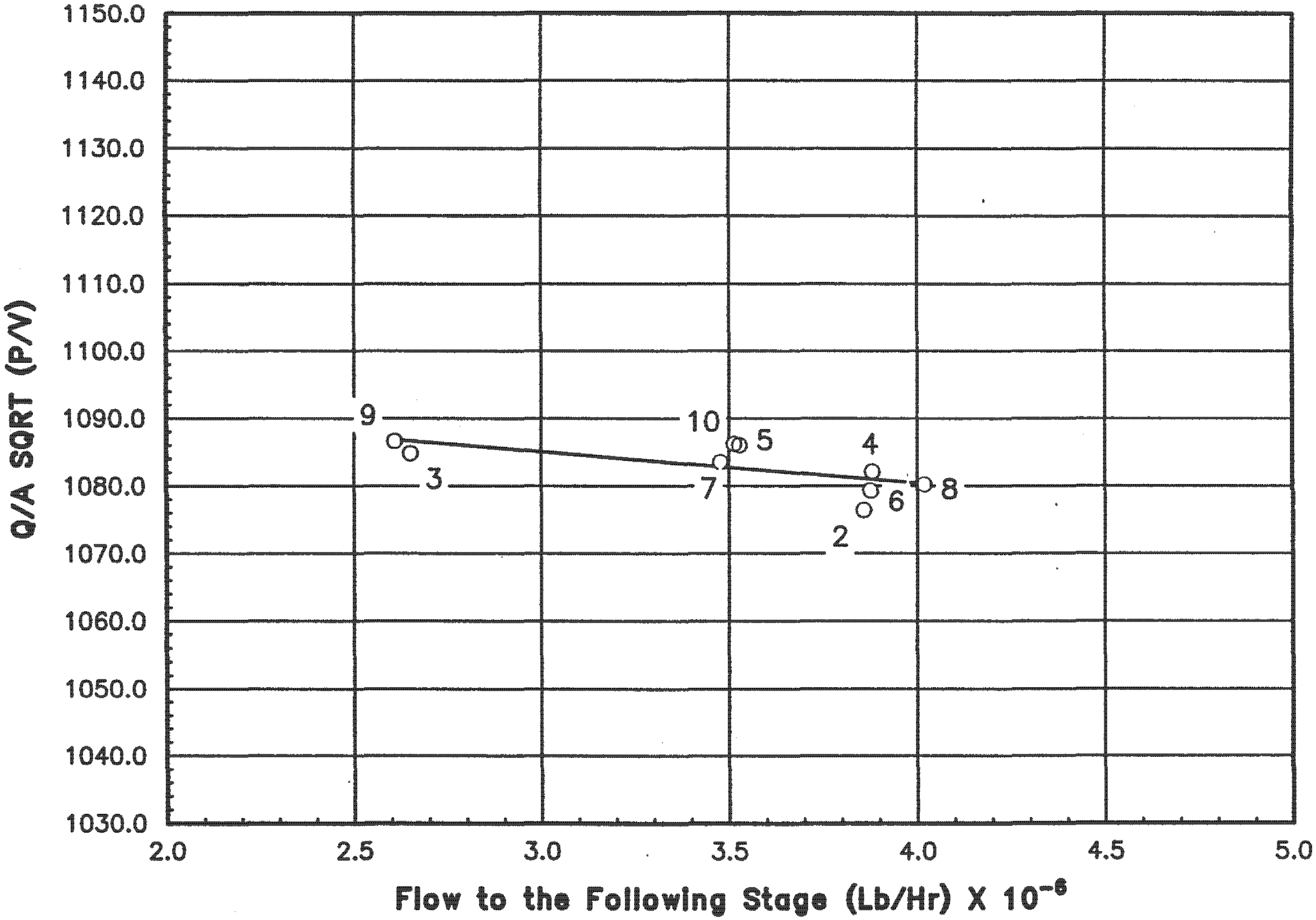
Fig. 25

Figure 25

INTERMOUNTAIN POWER CO.

IPP No. 2

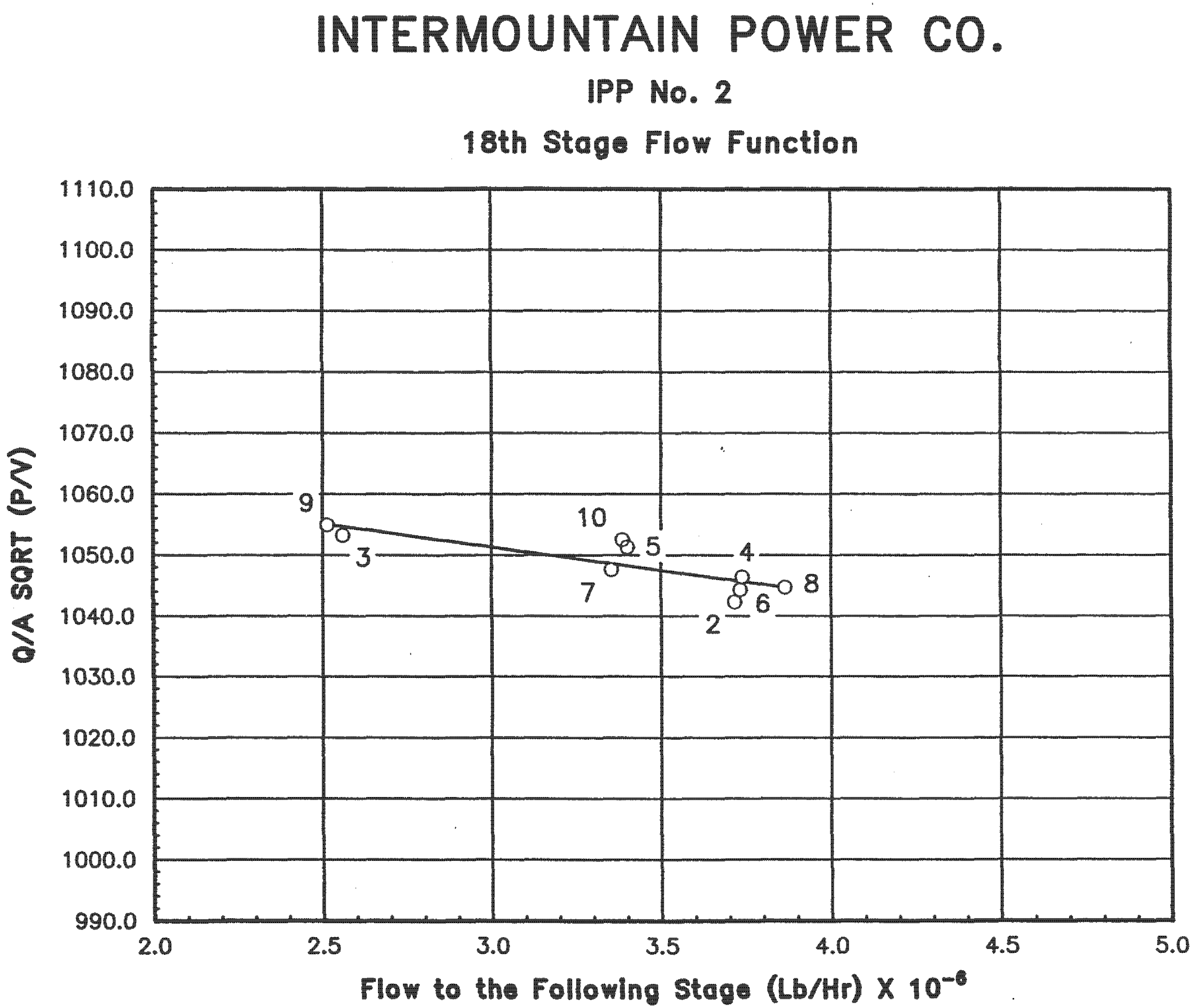
16th Stage Flow Function



IP14_005096

Fig. 26

Figure 26



IP14_005097

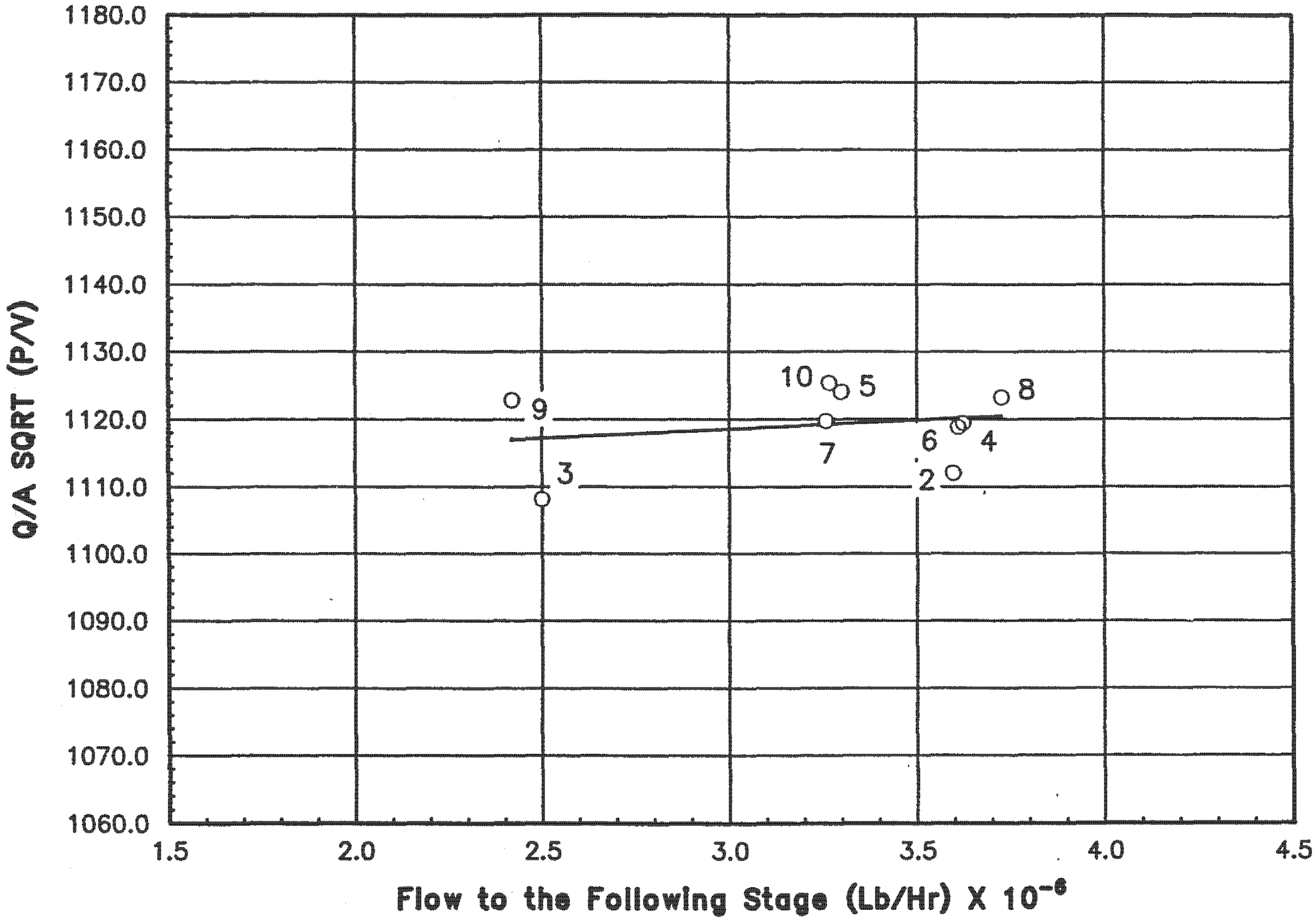
Fig. 27

Figure 27

INTERMOUNTAIN POWER CO.

IPP No. 2

19th Stage Flow Function



IP14_005098

Fig. 28

Figure 28

INTERMOUNTAIN POWER CO.

Unit No. 2 T 151

No. 1 Packing HPLO

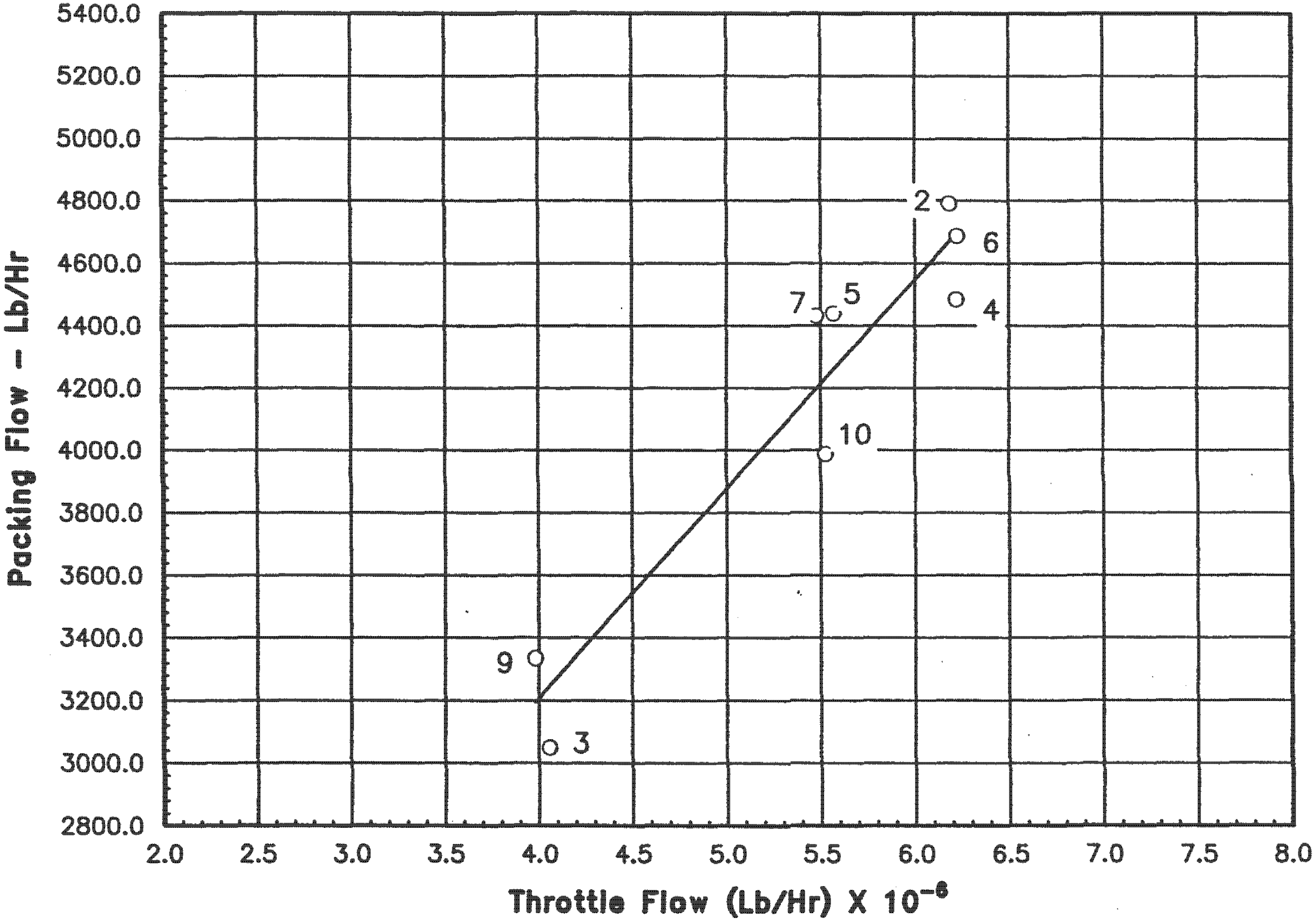


Fig. 29

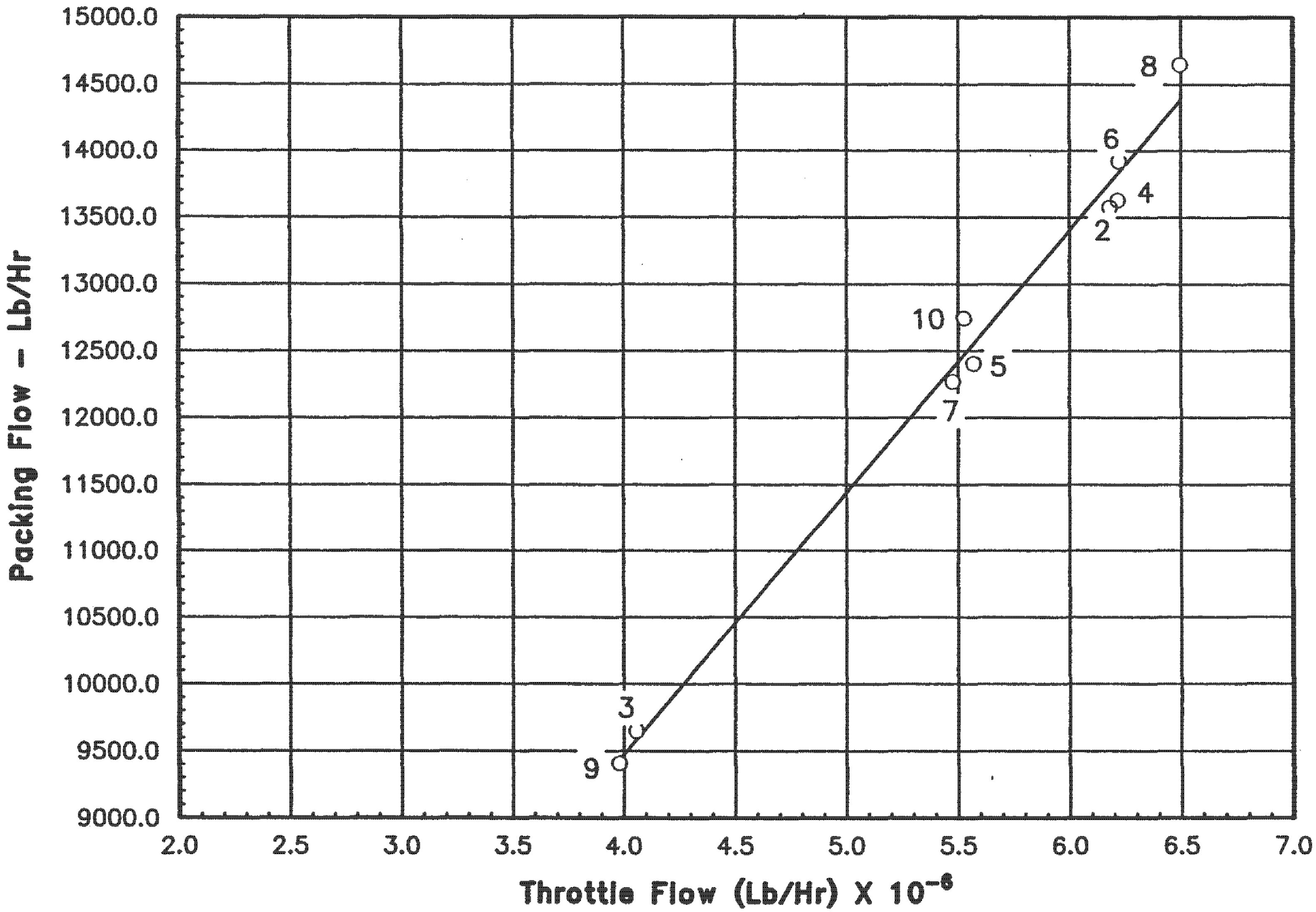
Figure 29

IP14_005099

INTERMOUNTAIN POWER CO.

Unit No. 2 T 151

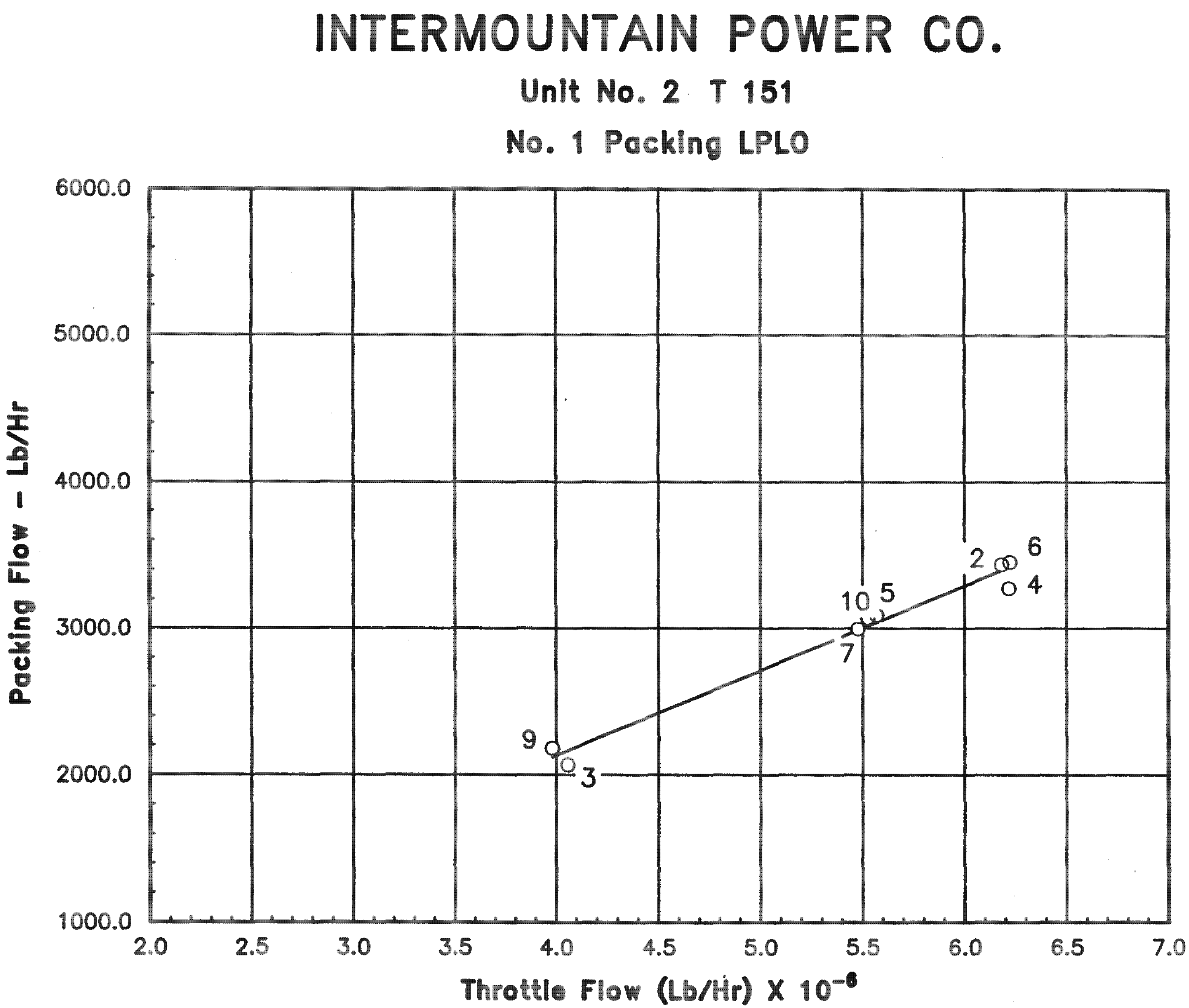
No. 2 Packing HPLO



IP14_005100

Fig. 30

Figure 30



IP14_005101

FIG. 31

Figure 31

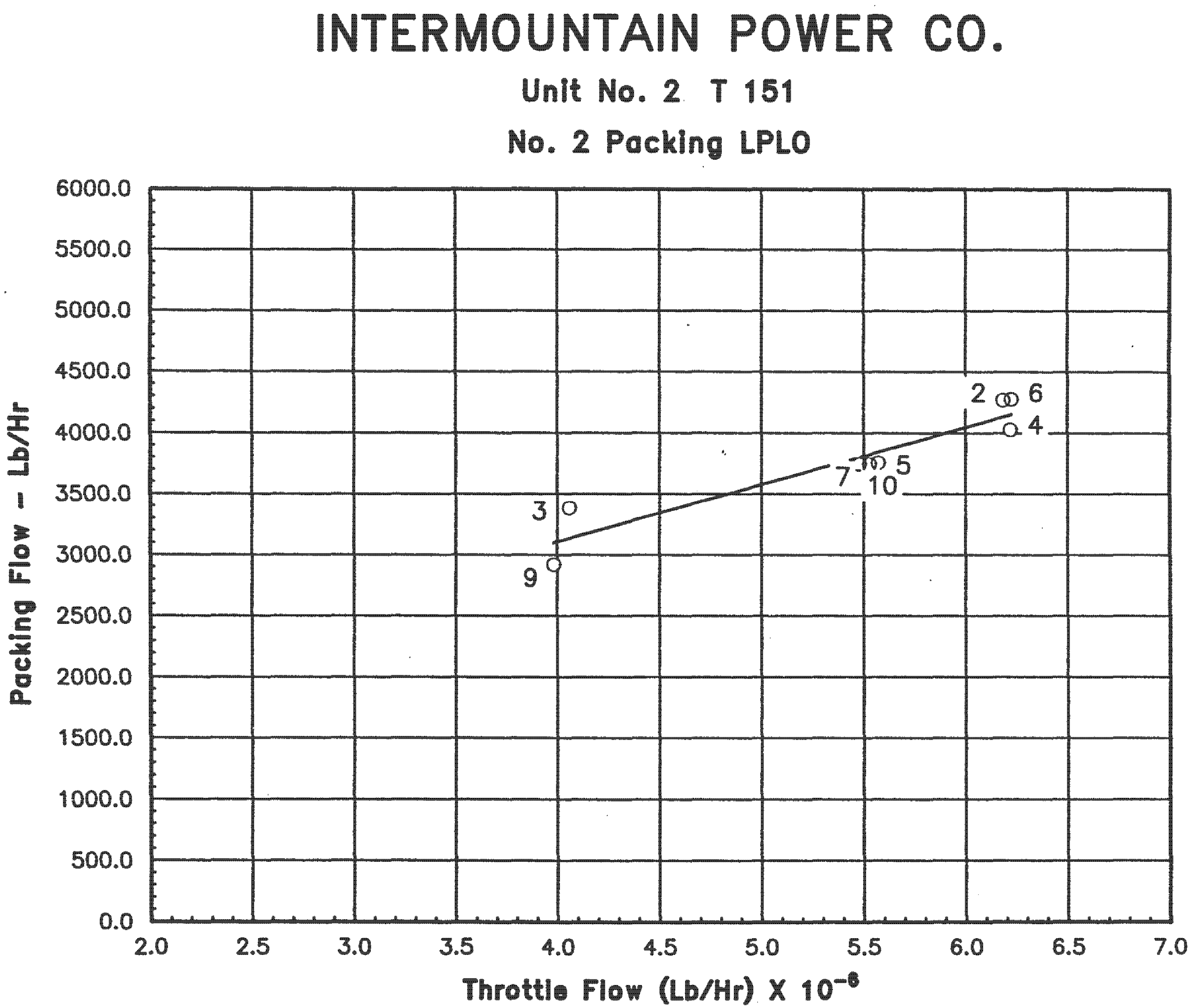


Figure 32

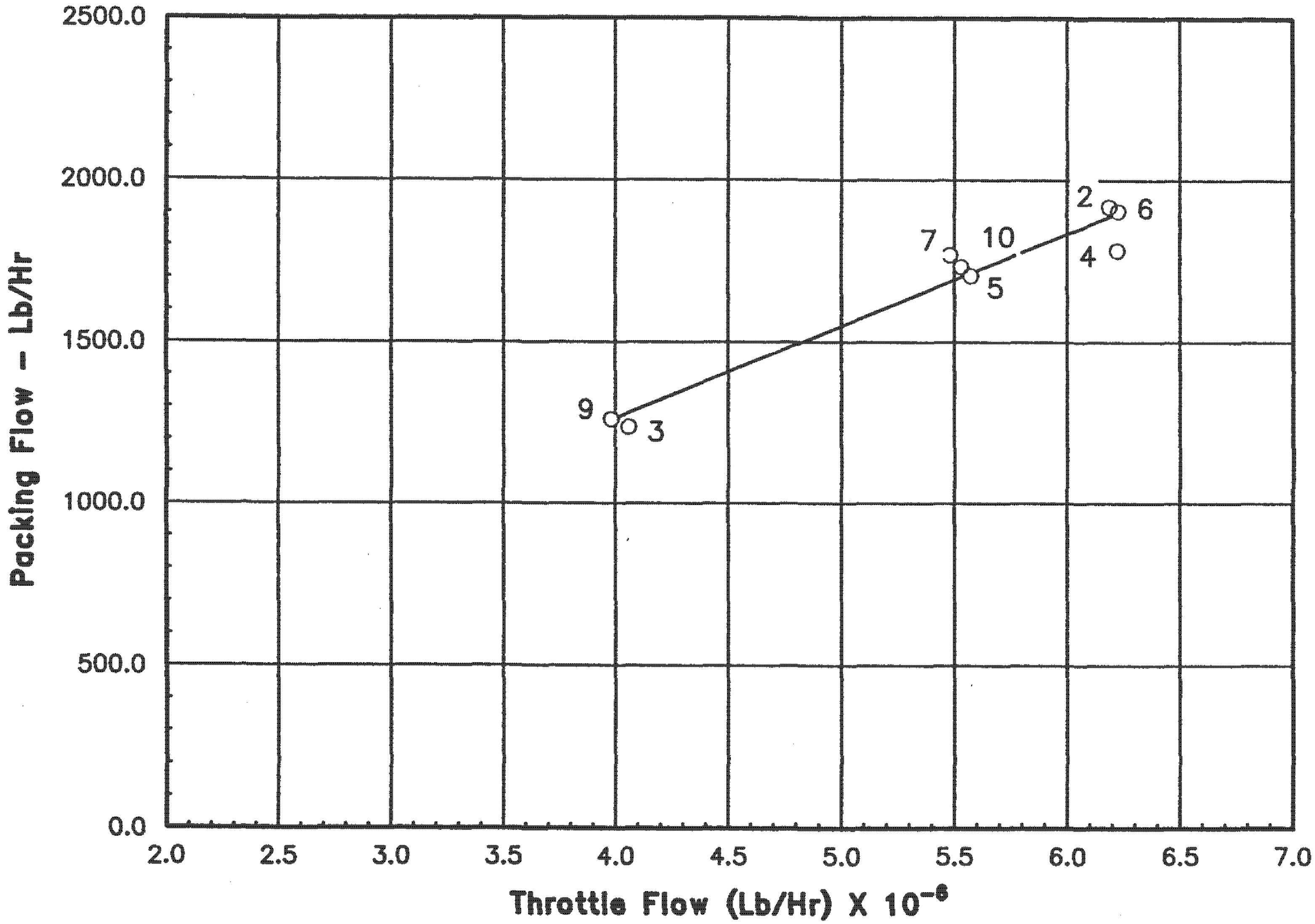
IP14_005102

Fig. 32

INTERMOUNTAIN POWER CO.

Unit No. 2 T 151

No. 3 Packing LPLO



IP14_005103

Fig. 33

Figure 33

INTERMOUNTAIN POWER CO.

Unit No. 2 T 151

No. 4 Packing LPLO

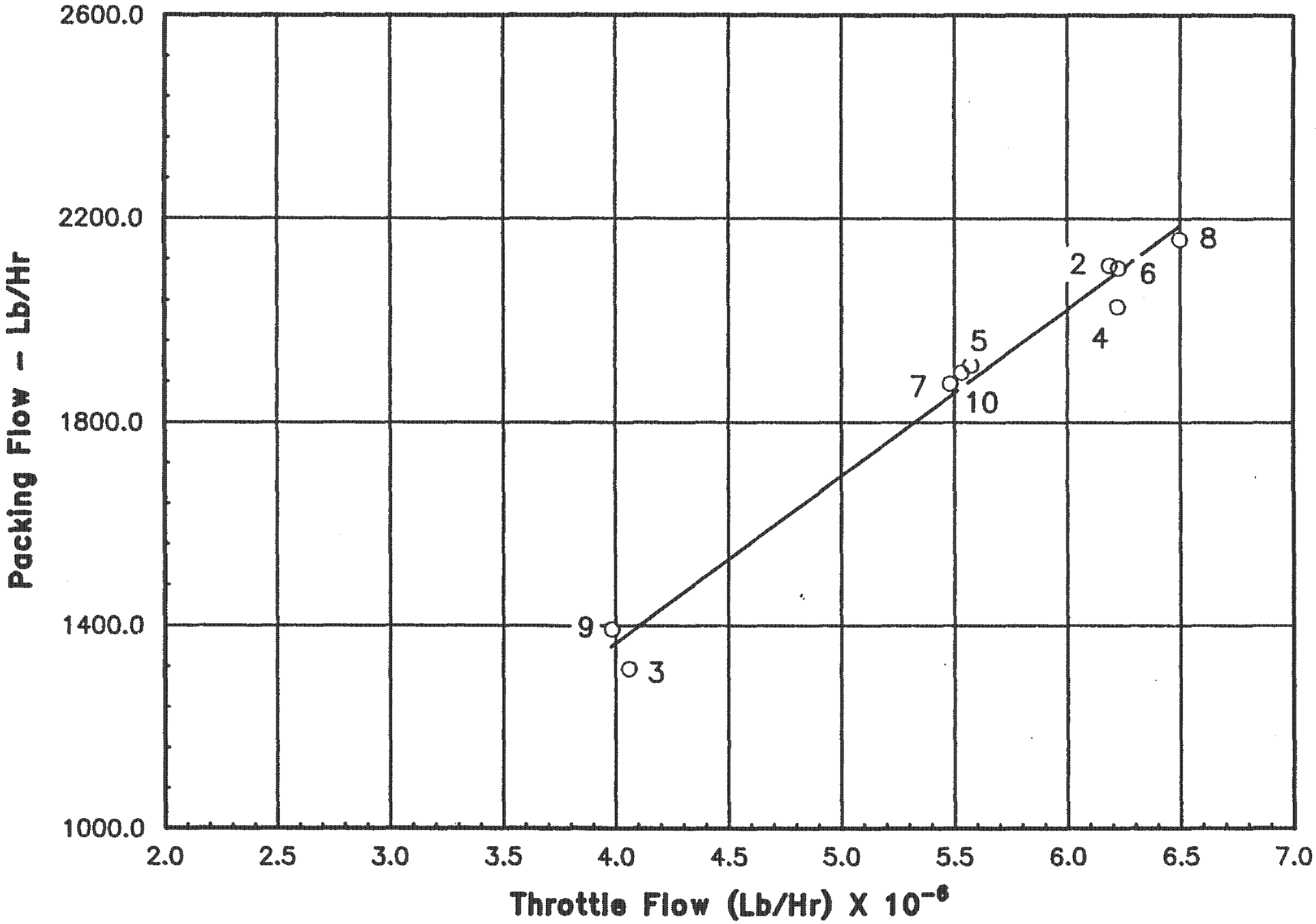


Figure 34

Fig. 34

APPENDIX A

Computer Output for Test Cycle Heat Balances for Test Points 2-10

Output Sheets

These output sheets should be used in conjunction with the trunkline diagram shown in Figure A1.

The following is a list of the nomenclature used in these output sheets:

FW	Feedwater
Inj	Injection
Ret	Return
MU	Makeup
LO	Leakoff
Shell	Conditions in turbine
Exh	Exhaust
AE	Available energy
ELEP	Expansion line end point
UEEP	Used energy end point
V_{AN}	Annulus velocity
TL	Trunkline
P	Pressure - psia
T	Temperature - degrees F
H	Enthalpy, BTU/LB
Q	Flow, lb./hr.
SV	Specific volume - ft^3/lb
SSR	Steam seal regulator

Pages 1 and 2 of the output sheets for each test point contain general information on turbine and cycle performance, such as heat rate, throttle flow, section efficiencies, and stage flow function. On page 1 under label "rated conditions", the load and heat rate have been corrected to rated power factor and rated H_2 pressure, and the throttle flow has been corrected to 2400 psig/1000F.

Pages 3-6 include designated component information. The column (TL) to the left of each sheet is a trunkline number used to easily identify points in the cycle. These TL numbers correspond to the number on sheet A1.

Pages 7 and 8 are a tabulation of all information stored in all trunklines. Although much of the same information is already included on pages 3-6, it is reprinted in TL form because not all TL numbers are printed on pages 3-6 and it is easier under some circumstances to look up information on the TL printout.

The column headings for the TL sheets are from left to right (TL) trunkline number, (P) pressure-psia, (T) temperature - ^{o}F, (H) enthalty - Btu/lb., (Q) flow lb./hr., (SV) specific volume-ft^{3}/lb. in most cases, (SP) an additional fluid property needed in the calculation such as enthalpy, (PV)-(P)/(SV) in most cases but not all; and (TR) transient storage for information needed in the calculation. This last storage area will also contain (Q)/A $\sqrt{(P)/(SV)}$

The page numbering system is as follows:

A0 3-1

where A is for appendix A and 3-1 identifies the test point as 3 and the page number as 1.

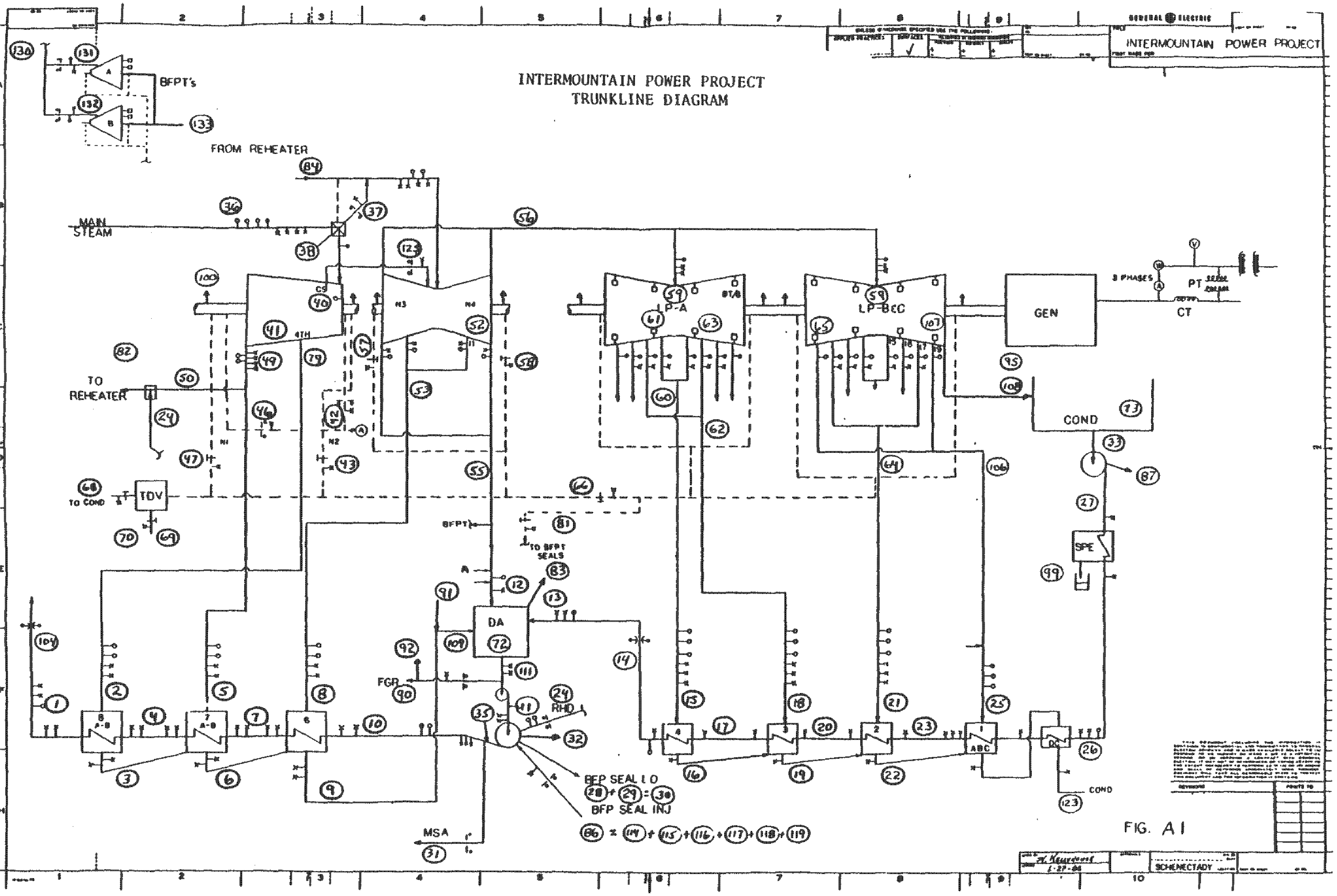

INTERMOUNTAIN POWER PROJECT
TRUNKLINE DIAGRAM
GENERAL ELECTRIC
INTERMOUNTAIN POWER PROJECT
BFPT's
FROM REHEATER
MAIN STEAM
TO REHEATER
TO COND
TDV
LP-A
LP-BEC
GEN
3 PHASES
PT
CT
COND
SPE
DA
FGR
RHD
BFP SEAL LO
BFP SEAL INJ
MSA
TO BFPT SEALS
COND
SCHENECTADY

FIG. A1

Fig. A1

TEST CYCLE HEAT BALANCE

VALVE POINT VWO	05/11/87	TEST POINT 02
INTERMOUNTAIN PWR PROJECT		UNIT #2
820000. KW	TC6F-30 IN LSB	TURBINE NO 270T151
2400. PSIG	1000./ 1000. F	2.300 IN HG ABS

CALCULATED USING ASME STEAM TABLES

COMBINED TURBINE-CYCLE PERFORMANCE

	TEST CONDITIONS	* RATED CONDITIONS
TOTAL LOAD	855960.	855119.
HEAT RATE	7855.9	7863.6
THROTTLE FLOW	6183909.	6285838.

TURBINE THERMAL PERFORMANCE

	HIGH PRESS TB		REHEAT TB		
			IP TB		LP TB
	THROTTLE	COLD RHT	INLET	EXH	EXH
PRESS	2384.10	566.00	521.40	118.50	3.739
TEMP	1004.90	625.10	999.59	617.20	122.95
ENTH	1464.67	1309.24	1519.47	1336.96	1032.15
ENTR	1.5364		1.7320	1.7471	
EFF	87.952		91.926		94.023

ABSCISSA PHPX/PT=0.2374 P1STSTG/PT=0.8045 VAN= 518.0

THRU FLOW PERFORMANCE OF CONDENSING SECTION SHAFT NO 1

	TOTAL TB ENERGY BALANCE		LP TB ENERGY BALANCE	
	RHT TB	LP TB	RHT TB	LP TB
AE	518.30	326.99		
H ELEP	1032.15		1032.15	
H UEEP	1040.68		1040.68	
EFF ELEP	94.02	93.22	94.02	93.22
EFF UEEP	92.38	90.61	92.38	90.61
VAN	518.03		518.03	

* LOAD AND HEAT RATE AT RATED POWER FACTOR AND H2 PRESS. FLOW AT RATED THROTTLE PRESS. OF 2412.2 PSIA AND TEMP. OF 1000 F.

T G L PERFORMANCE OF CONDENSING SECTION SHAFT NO 1

	TOTAL TB ENERGY BALANCE		LP TB ENERGY BALANCE	
	RHT TB	LP TB	RHT TB	LP TB
H ELEP	1034.72		1034.72	
H UEEP	1043.26		1043.26	
EFF ELEP	93.53	92.43	93.53	92.43
EFF UEEP	91.88	89.82	91.88	89.82
VAN	519.45		519.45	

STAGE FLOW FUNCTION

STG NO	SHELL PRESS	ONE VEL HD	PCT DELTA P	FLANGE PRESS	NOZ AREA	Q/AP H FLG	QFS	Q/AP H SHL
1	1918.00	0.	0.	0.	86.6	0.	6123308.	1007.1
4	1086.39	4.282	1.24	1072.90	157.4	848.4	5525420.	843.1
RH 1	521.40	0.	0.	0.	350.2	0.	5012929.	799.9
8	510.97	0.	0.	0.	350.2	0.	5030848.	819.0
11	233.00	0.811	1.11	230.40	711.2	790.7	4798678.	780.3
15	118.50	0.	0.	0.	807.6	0.	4277024.	1122.2
15	65.19	0.287	1.28	64.36	1414.8	1086.5	4137685.	1059.4
16	39.70	0.189	1.38	39.15	2021.4	1101.9	3856782.	1076.4
18	11.64	0.057	1.43	11.48	6018.0	1079.4	3715227.	1042.3
19	5.01	0.021	1.19	4.95	12096.0	1118.8	3594785.	1112.1

F E E D W A T E R   C Y C L E

TL		PRESS	TEMP	ENTH	FLOW		
						HEATER	8
4	FW IN	2728.40	478.50	463.22	6161067.4	CLOSED	
2	EXTR	1062.50	795.70	1383.93	579451.5	TD =	-0.1
3	DRAIN	1062.50	485.80	471.18	579451.5	DC =	7.3
						HEATER	7
7	FW IN	2728.40	394.50	372.31	6161067.4	CLOSED	
5	EXTR	553.10	624.30	1309.77	544362.4	TD =	-1.0
6	DRAIN	553.10	403.30	379.00	1123813.8	DC =	8.8
3	ENTRY	1062.50	485.80	471.18	579451.5		
						HEATER	6
10	FW IN	2826.00	345.10	321.01	6161067.4	CLOSED	
8	EXTR	228.70	799.80	1424.20	232170.1	TD =	-1.3
9	DRAIN	228.70	352.80	324.84	1355984.0	DC =	7.7
6	ENTRY	553.10	403.30	379.00	1123813.8		
						PUMP	
11	FW IN	0.	0.	0.	6147184.2		
86	SEAL INJ	0.	0.	0.	110957.1		
30	SEAL RET	0.	0.	0.	65681.0		
32	LEAKAGE	0.	0.	0.	0.		
24	EXTR	1500.00	200.00	171.47	0.		
35	FW OUT	2826.00	345.10	321.01	6192460.3		
						HEATER	5
13	FW IN	127.30	295.80	265.51	4513807.5	OPEN	
12	EXTR	118.30	617.90	1337.32	278489.7	STO =	797.0
111	DRAIN	118.30	340.10	311.36	7143589.9	SC =	0.1
109	ENTRY	0.	0.	278.04	2352389.8		
						HEATER	4
17	FW IN	173.80	264.00	233.10	4513807.8	CLOSED	
15	EXTR	63.26	514.70	1290.11	139338.8	TD =	0.4
16	DRAIN	63.26	268.60	237.57	139338.8	DC =	4.6
						HEATER	3
20	FW IN	173.80	196.10	164.54	4513807.8	CLOSED	
18	EXTR	38.23	413.70	1243.33	280903.0	TD =	0.5
19	DRAIN	38.23	205.20	173.37	420241.8	DC =	9.1
16	ENTRY	63.26	268.60	237.57	139338.8		
						HEATER	2
23	FW IN	173.80	160.50	128.86	4513807.8	CLOSED	
21	EXTR	11.04	233.50	1162.08	141555.3	TD =	1.8
22	DRAIN	11.04	167.90	135.88	561797.2	DC =	7.4
19	ENTRY	38.23	205.20	173.37	420241.8		

```
   TL            PRESS       TEMP       ENTH        FLOW


                                                           STM SEAL REG
  88  FLOW TO     O.          O.         O.         4149.8  CALCULATED
  70  TDV         5.11      660.40    1365.02       4149.8  TO HEATER
  68  TDV         2.21      470.00    1274.35         O.   TO CONDENSER
    NOT CODED FOR MU    MEAS TOTAL FLOW =           O.

                                                          HEATER          1
  26 FW IN      222.10     128.70      97.21    4513807.8  CLOSED
  25 EXTR         4.86       O.      1087.61     120442.1  TD =         0.6
 123 DRAIN        4.86     134.20     102.16     686389.1  DC =         5.5
  22 ENTRY       11.04     167.90     135.88     561797.2
  70 ENTRY        5.11     660.40    1365.02       4149.8

                                                           PUMP
  33  FW IN       O.         O.          O.     4624764.8
  87  LEAKAGE     O.         O.          O.          O.
  27  FW OUT       O.         O.          O.     4624764.8

                                                           FW TO BOILER


   1  FW IN    2728.40     552.10     549.07    6161067.4  S+L =   -8551.

                        T U R B I N E   E X P A N S I O N

                                                           MAIN STEAM LINE
  71 EXIT         O.         O.      1464.67         O.
  36 THROTTLE 2384.10    1004.90    1464.67    6183909.3

                                                           VALVE STEM LKG

                                                        SQRT P/V =  85.583
  37 LO NO  1  521.60     897.90    1464.67       2772.2  C =     55.714

                                                        SQRT P/V =  18.640
  38 LO NO  2    O.         O.         O.         1996.0  C =    107.081


                                                          EXP TO STG      1
  40 SHELL    1918.00     942.33    1440.06    6123307.6
 112 EXTR        O.         O.      1440.06      55833.4

                                                        PACKING NO     2

                                                        SQRT P/V =.115E 19
  42 LO NO  1  123.17     700.00    1378.36      13574.6  C =      0.000

                                                        SQRT P/V =   4.718
  43 LO NO  2   17.14     690.50    1379.04       4273.7  C =   1030.390

                                                        SQRT P/V =   0.655
 100 LO NO  3    O.         O.         O.          587.4  C =   1769.447
```

TL	PRESS	TEMP	ENTH	FLOW	
				EXP TO STG	4
41 SHELL	1086.39	0.	1384.71	5525420.4	
79 EXTR	1072.90	797.80	1384.71	579451.5	
				PACKING NO	1
				SQRT P/V =	23.281
46 LO NO 1	121.87	609.30	1332.80	4789.9	C = 378.653
				SQRT P/V =	4.874
47 LO NO 2	17.02	589.20	1329.88	3438.1	C = 825.981
				SQRT P/V =	0.682
100 LO NO 3	0.	0.	0.	587.4	C = 1769.447
				EXPAND TO EXHAUST	
49 EXH	566.00	625.10	1309.24	5554519.3	
80 EXTR	566.00	625.10	1309.24	544362.4	
50 TO RHT	566.00	625.10	1309.24	5010156.9	
				REHEATER	1
BEFORE LO	0.08	0.	1519.83	0.	
37 ENTRY					
84 AFTER LO	521.40	1000.20	1519.80	5012929.1	PCTDP = 7.880
				EXPAND TO BOWL	
51 ENTRY	510.97	999.02	1519.47	5030848.4	
125 ENTRY	529.52	827.00	1426.65	17919.2	
				EXP TO STG	11
52 SHELL	233.00	0.	1414.79	4798678.3	
53 EXTR	230.40	801.20	1424.85	232170.1	
				PACKING NO	3
				SQRT P/V =	4.719
57 LO NO 1	16.99	634.30	1351.68	1919.2	C = 1102.299
				SQRT P/V =	0.666
58 LO NO 2	17.00	643.40	1356.09	2108.0	C = 4926.706
				SQRT P/V =	0.664
100 LO NO 3	0.	0.	0.	587.4	C = 1769.447
				SQRT P/V =	0.
100 LO NO 4	0.	0.	0.	587.4	C = 1769.447

TL	PRESS	TEMP	ENTH	FLOW	
					EXPAND TO EXHAUST
56 EXH	118.50	617.20	1336.96	4277024.0	
55 EXTR	121.40	620.20	1338.28	516452.4	
					EXPAND TO BOWL
59 ENTRY	118.50	617.20	1336.96	4277024.0	
					EXP TO STG 15
61 SHELL	65.19	0.	1277.73	4137685.2	
60 EXTR	64.36	525.30	1295.23	139338.8	
					EXP TO STG 16
63 SHELL	39.70	0.	1233.19	3856782.2	
62 EXTR	39.15	421.30	1246.91	280903.0	
					EXP TO STG 18
65 SHELL	11.64	0.	1141.41	3715226.8	
64 EXTR	11.48	233.40	1161.88	141555.3	
					EXP TO STG 19
107 SHELL	5.01	0.	1088.57	3594784.7	
106 EXTR	4.95	0.	1087.61	120442.1	

TL	PRESS	TEMP	ENTH	FLOW	
					CONDENSER
					SHAFT 1
108 TB EXH	1.84	122.95	1040.6816	3594784.7	LEVL = -9648.0
76 ENTRY	0.	0.	0.	1020332.7	
122 DRAIN	0.	0.	0.	4624765.4	
					GENERATOR 1
					SHAFT 1

MEASURED LOAD = 855960.0 PF = 0.987 H2 = 64.00
SHAFT 1 KW = 867816.4 FL =4353.0 GL = 7503.4

TEST CYCLE HEAT BALANCE

P E R F O R M A N C E

TRUNKLINE OUTPUT

TL	P	T	H	Q	SV	SP	PV	TR
1	2728.4	552.1	549.1	6161067.	0.0213	0.	0.	-8551.0
2	1062.5	795.7	1383.9	579451.	0.6399	551.990	-0.110	243.7
3	1062.5	485.8	471.2	579451.	0.0200	0.	7.300	0.
4	2728.4	478.5	463.2	6161067.	0.	0.	0.	0.
5	553.1	624.3	1309.8	544362.	1.0701	477.533	-0.967	146.8
6	553.1	403.3	379.0	1123814.	0.0186	0.	8.800	0.
7	2728.4	394.5	372.3	6161067.	0.	0.	0.	0.
8	228.7	799.8	1424.2	232170.	3.2200	393.208	-1.292	406.6
9	228.7	352.8	324.8	1355984.	0.0180	0.	7.700	0.
10	2826.0	345.1	321.0	6161067.	0.0177	0.	0.	0.
11	0.	0.	0.	6147184.	0.	0.	0.	0.
12	118.3	617.9	1337.3	278490.	5.3338	340.195	797.000	277.7
13	127.3	295.8	265.5	4513808.	0.0174	0.	0.	0.
14	173.8	295.8	265.6	4513808.	0.0174	1.014	0.	173.8
15	63.3	514.7	1290.1	139339.	9.0533	296.184	0.384	218.5
16	63.3	268.6	237.6	139339.	0.0172	0.	4.600	0.
17	173.8	264.0	233.1	4513808.	0.	0.	0.	0.
18	38.2	413.7	1243.3	280903.	13.4391	264.528	0.528	149.2
19	38.2	205.2	173.4	420242.	0.0167	0.	9.100	0.
20	173.8	196.1	164.5	4513808.	0.	0.	0.	0.
21	11.0	233.5	1162.1	141555.	37.0328	197.914	1.814	35.6
22	11.0	167.9	135.9	561797.	0.0164	0.	7.400	0.
23	173.8	160.5	128.9	4513808.	0.	0.	0.	0.
24	1500.0	200.0	171.5	0.	0.0166	0.	0.	0.
25	4.9	0.	1087.6	120442.	0.	161.064	0.564	-161.1
26	222.1	128.7	97.2	4513808.	0.0162	0.	0.	0.
27	0.	0.	0.	4624765.	0.	0.	0.	0.
28	0.	0.	0.	18723.	0.	0.	0.	0.
29	0.	0.	0.	46958.	0.	0.	0.	0.
30	0.	0.	0.	65681.	0.	0.	0.	0.
31	2835.9	342.6	318.5	31393.	0.0177	1.000	0.	2835.9
33	0.	0.	0.	4624765.	0.	0.	0.	0.
34	0.	0.	0.	-8551.	0.	0.	0.	0.
35	2826.0	345.1	321.0	6192460.	0.0177	0.	0.	0.
36	2384.1	1004.9	1464.7	6183909.	0.3255	0.133E 37	85.583	0.
37	521.6	897.9	1464.7	2772.	1.5012	0.780	18.640	55.7
38	0.	0.	0.	1996.	0.	0.	0.	107.1
39	2384.1	0.	1464.7	6179141.	0.3255	0.	85.583	0.
40	1918.0	942.3	1440.1	6123308.	0.3891	147.682	70.211	0.
41	1086.4	0.	1384.7	5525420.	0.6266	555.122	41.638	843.1
42	123.2	700.0	1378.4	13575.	5.5340	0.779	4.718	0.0
43	17.1	690.5	1379.0	4274.	39.8960	0.	0.655	1030.4
45	0.	0.	0.	37914.	0.	0.	0.	0.
46	121.9	609.3	1332.8	4790.	5.1311	0.703	4.874	378.7
47	17.0	589.2	1329.9	3438.	36.6111	0.	0.682	826.0
48	0.	0.	0.	5563335.	0.	0.	0.	0.
49	566.0	625.1	1309.2	5554519.	1.0443	479.972	23.281	0.
50	566.0	625.1	1309.2	5010157.	0.	0.	0.	0.
51	511.0	999.0	1519.5	5030848.	1.6614	0.	17.541	0.

TL	P	T	H	Q	SV	SP	PV	TR
52	233.0	0.	1414.8	4798678.	3.1161	395.222	8.647	780.3
53	230.4	801.2	1424.8	232170.	3.1996	393.848	8.486	0.
54	118.5	617.2	1337.0	4793476.	5.3210	0.	4.719	0.
55	121.4	620.2	1338.3	516452.	5.2071	342.138	0.	0.
56	118.5	617.2	1337.0	4277024.	5.3210	340.322	0.	0.
57	17.0	634.3	1351.7	1919.	38.2676	0.	0.666	1102.3
58	17.0	643.4	1356.1	2108.	38.5658	0.	0.664	4926.7
59	118.5	617.2	1337.0	4277024.	5.3210	0.	4.719	0.
60	64.4	525.3	1295.2	139339.	8.9984	297.323	2.674	0.
61	65.2	0.	1277.7	4137685.	8.5545	298.277	2.761	1059.4
62	39.2	421.3	1246.9	280903.	13.2395	265.955	1.720	0.
63	39.7	0.	1233.2	3856782.	12.6351	266.971	1.773	1076.4
64	11.5	233.4	1161.9	141555.	35.5932	199.798	0.568	0.
65	11.6	0.	1141.4	3715227.	33.1879	200.920	0.592	1042.3
66	16.7	636.2	1352.6	9585.	39.1192	0.	0.	0.
67	118.3	342.7	1191.6	0.	3.7941	0.	0.	0.
68	2.2	470.0	1274.4	0.	251.0113	0.	0.	0.
69	5.1	660.4	1365.0	1581.	130.5876	0.	0.	0.
70	5.1	660.4	1365.0	4150.	130.5876	0.	0.	0.
71	0.	0.	1464.7	0.	0.	0.	0.	0.
72	0.	0.	0.	797.	0.	0.	0.	0.
73	0.	0.	0.	-9648.	0.	0.	0.	0.
75	0.	0.	0.	6061.	0.	0.	0.	0.
76	0.	0.	0.	1020333.	0.	0.	0.	0.
79	1072.9	797.8	1384.7	579451.	0.6346	553.190	41.119	0.
80	566.0	625.1	1309.2	544362.	0.	0.	0.	0.
81	16.7	636.2	1352.6	0.	39.1192	0.	0.	0.
82	0.	0.	0.	5010157.	0.	0.	0.	0.
83	118.3	340.2	1190.1	300.	0.	0.	0.	0.
84	521.4	1000.2	1519.8	5012929.	1.6281	7.880	17.896	799.9
86	0.	0.	0.	110957.	0.	0.	0.	0.
88	0.	0.	0.	4150.	0.	0.	0.	0.
90	148.3	340.1	311.4	0.	0.0179	0.	0.	0.
91	139.1	245.6	214.4	996406.	0.0170	0.647	0.	139.1
95	1.8	122.9	1032.1	3594785.	173.0669	1040.682	3.739	518.0
99	0.	0.	0.	6462.	0.	0.	0.	0.
100	0.	0.	0.	587.	0.	0.	0.	1769.4
104	2728.4	552.1	549.1	6165490.	0.0213	1.028	0.	2728.4
106	5.0	0.	1087.6	120442.	70.9891	161.828	0.264	0.
107	5.0	0.	1088.6	3594785.	70.1785	0.	0.267	1112.1
108	1.8	122.9	1040.7	3594785.	188.2706	1040.682	3.739	-9648.0
109	0.	0.	278.0	2352390.	0.	0.	0.	0.
111	118.3	340.1	311.4	7143590.	0.0179	0.	0.095	0.
112	0.	0.	1440.1	55833.	0.	0.	0.	0.
113	0.	0.	0.	6104872.	0.	0.	0.115E 19	0.
114	411.6	128.0	97.0	14915.	0.0162	0.624	0.	411.6
115	411.6	128.0	97.0	8971.	0.0162	0.624	0.	411.6
116	411.6	128.0	97.0	28375.	0.0162	0.623	0.	411.6
117	411.6	128.0	97.0	13843.	0.0162	0.660	0.	411.6
118	411.6	128.0	97.0	22578.	0.0162	0.660	0.	411.6
119	411.6	128.0	97.0	22274.	0.0162	0.660	0.	411.6
120	0.	0.	0.	4768.	0.	0.	0.	0.
122	0.	0.	0.	4624765.	0.	0.	0.	0.
123	4.9	134.2	102.2	686389.	0.0163	0.	5.500	0.
125	529.5	827.0	1426.6	17919.	1.3913	0.628	0.	515.5
130	0.	0.	0.	256327.	0.	0.	0.	0.
131	119.3	617.8	1337.2	131273.	5.2878	1.019	0.	119.3
132	119.1	617.5	1337.1	125054.	5.2953	1.019	0.	119.1
133	0.	0.	0.	255740.	0.	0.	0.	0.
201	0.1	0.	1519.8	0.	0.	210.590	0.	0.

TEST CYCLE HEAT BALANCE

VALVE POINT 2ND VL	05/13/87	TEST POINT 03
INTERMOUNTAIN PWR PROJECT		UNIT #2
820000. KW	TC6F-30 IN LSB	TURBINE NO 270T151
2400. PSIG	1000./ 1000. F	2.300 IN HG ABS

CALCULATED USING ASME STEAM TABLES

COMBINED TURBINE-CYCLE PERFORMANCE

	TEST CONDITIONS	* RATED CONDITIONS
TOTAL LOAD	592031.	591526.
HEAT RATE	7980.0	7986.8
THROTTLE FLOW	4056100.	4099223.

TURBINE THERMAL PERFORMANCE

	HIGH PRESS TB		REHEAT TB		
			IP TB		LP TB
	THROTTLE	COLD RHT	INLET	EXH	EXH
PRESS	2399.80	384.30	354.00	81.02	3.074
TEMP	1007.20	566.80	1000.44	621.20	115.92
ENTH	1465.68	1289.21	1524.83	1341.35	1046.78
ENTR	1.5365		1.7775	1.7925	
EFF	81.515		92.000		94.013

ABSCISSA PHPX/PT=0.1601 P1STSTG/PT=0.5148 VAN= 440.9

THRU FLOW PERFORMANCE OF CONDENSING SECTION SHAFT NO 1

	TOTAL TB ENERGY BALANCE		LP TB ENERGY BALANCE	
	RHT TB	LP TB	RHT TB	LP TB
AE	508.50	316.38		
H ELEP	1046.78		1046.78	
H UEEP	1059.29		1059.29	
EFF ELEP	94.01	93.10	94.01	93.10
EFF UEEP	91.55	89.15	91.55	89.15
VAN	440.89		440.89	

* LOAD AND HEAT RATE AT RATED POWER FACTOR AND H2 PRESS. FLOW AT RATED THROTTLE PRESS. OF 2412.2 PSIA AND TEMP. OF 1000 F.

A03-1

T G L PERFORMANCE OF CONDENSING SECTION SHAFT NO 1

	TOTAL TB ENERGY BALANCE RHT TB	TOTAL TB ENERGY BALANCE LP TB	LP TB ENERGY BALANCE RHT TB	LP TB ENERGY BALANCE LP TB
H ELEP	1048.96		1048.96	
H UEEP	1061.46		1061.46	
EFF ELEP	93.58	92.42	93.58	92.42
EFF UEEP	91.13	88.47	91.13	88.47
VAN	441.89		441.89	

STAGE FLOW FUNCTION

STG NO	SHELL PRESS	ONE VEL HD	PCT DELTA P	FLANGE PRESS	NOZ AREA	Q/AP H FLG	QFS	Q/AP H SHL
1	1235.50	0.	0.	0.	86.6	0.	4014276.	999.8
4	718.77	1.959	0.86	712.60	157.4	832.0	3673957.	828.4
RH 1	354.00	0.	0.	0.	350.2	0.	3375577.	796.7
8	346.92	0.	0.	0.	350.2	0.	3387567.	815.7
11	157.60	0.499	1.01	156.00	711.2	791.5	3238282.	782.2
15	81.02	0.	0.	0.	807.6	0.	2910222.	1122.1
15	44.64	0.156	1.01	44.19	1414.8	1087.0	2825494.	1064.1
16	27.27	0.110	1.17	26.95	2021.4	1105.3	2648608.	1084.7
18	7.96	0.035	1.27	7.86	6018.0	1097.7	2558119.	1053.2
19	3.48	0.007	0.62	3.46	12096.0	1111.6	2497392.	1108.1

TL		PRESS	TEMP	ENTH	FLOW		

F E E D W A T E R   C Y C L E

						HEATER	8
4	FW IN	2598.00	441.40	422.30	4060147.6	CLOSED	
2	EXTR	708.80	720.70	1357.50	326721.3	TD =	-4.0
3	DRAIN	708.80	445.80	425.69	326721.3	DC =	4.4
						HEATER	7
7	FW IN	2598.00	365.10	341.35	4060147.6	CLOSED	
5	EXTR	376.80	566.00	1289.43	319656.0	TD =	-2.6
6	DRAIN	376.80	371.10	344.36	646377.3	DC =	6.0
3	ENTRY	708.80	445.80	425.69	326721.3		
						HEATER	6
10	FW IN	2728.40	316.30	291.30	4060147.6	CLOSED	
8	EXTR	155.70	800.90	1427.81	149285.1	TD =	-3.7
9	DRAIN	155.70	321.70	292.28	795662.4	DC =	5.4
6	ENTRY	376.80	371.10	344.36	646377.3		
						PUMP	
11	FW IN	0.	0.	0.	4021693.2		
86	SEAL INJ	0.	0.	0.	93029.4		
30	SEAL RET	0.	0.	0.	54575.0		
32	LEAKAGE	0.	0.	0.	0.		
24	EXTR	1500.00	246.50	218.13	0.		
35	FW OUT	2728.40	316.30	291.30	4060147.6		
						HEATER	5
13	FW IN	89.01	272.80	241.90	3044763.5	OPEN	
12	EXTR	80.19	617.90	1339.77	182250.9	STO =	778.4
111	DRAIN	80.19	312.50	282.62	5171452.2	SC =	-0.3
109	ENTRY	0.	0.	247.45	1945421.4		
						HEATER	4
17	FW IN	131.80	243.30	212.01	3044763.8	CLOSED	
15	EXTR	43.47	514.70	1291.86	84727.4	TD =	-0.5
16	DRAIN	43.47	246.30	214.87	84727.4	DC =	3.0
						HEATER	3
20	FW IN	131.80	178.60	146.89	3044763.8	CLOSED	
18	EXTR	25.99	414.90	1245.52	176886.0	TD =	-1.1
19	DRAIN	25.99	185.70	153.76	261613.4	DC =	7.1
16	ENTRY	43.47	246.30	214.87	84727.4		
						HEATER	2
23	FW IN	131.80	146.10	114.36	3044763.8	CLOSED	
21	EXTR	7.51	238.60	1165.62	90489.1	TD =	1.4
22	DRAIN	7.51	164.60	132.57	352102.6	DC =	18.5
19	ENTRY	25.99	185.70	153.76	261613.4		

TL		PRESS	TEMP	ENTH	FLOW		
						STM SEAL REG	
88	FLOW TO	0.	0.	0.	2353.0	CALCULATED	
70	TDV	1.57	563.90	1318.84	2353.0	TO HEATER	
68	TDV	1.85	480.00	1279.09	0.	TO CONDENSER	
	NOT CODED FOR MU		MEAS TOTAL FLOW =		0.		
						HEATER	1
26	FW IN	171.00	125.10	93.49	3044763.8	CLOSED	
25	EXTR	3.44	0.	1094.42	60727.6	TD =	0.8
123	DRAIN	3.44	127.20	95.16	63080.6	DC =	2.1
70	ENTRY	1.57	563.90	1318.84	2353.0		
						PUMP	
33	FW IN	0.	0.	0.	3137793.2		
87	LEAKAGE	0.	0.	0.	0.		
27	FW OUT	0.	0.	0.	3137793.2		
						FW TO BOILER	
1	FW IN	2598.00	508.50	497.28	4060147.6	S+L =	-4047.

T U R B I N E E X P A N S I O N

TL		PRESS	TEMP	ENTH	FLOW		
						MAIN STEAM LINE	
71	EXIT	0.	0.	1465.68	0.		
36	THROTTLE	2399.80	1007.20	1465.68	4056100.2		
						VALVE STEM LKG	
						SQRT P/V =	86.079
37	LO NO 1	354.20	888.64	1465.68	2281.2	C =	55.758
						SQRT P/V =	12.638
38	LO NO 2	0.	0.	0.	2518.4	C =	199.263
						EXP TO STG	1
40	SHELL	1235.50	849.55	1409.00	4014275.6		
112	EXTR	0.	0.	1409.00	37025.0		
						PACKING NO	2
						SQRT P/V =	.115E 19
42	LO NO 1	84.08	641.00	1351.05	9647.6	C =	0.000
						SQRT P/V =	3.302
43	LO NO 2	13.68	638.50	1353.91	3385.9	C =	1196.275
						SQRT P/V =	0.535
100	LO NO 3	0.	0.	0.	563.9	C =	2117.000

TL	PRESS	TEMP	ENTH	FLOW	
					EXP TO STG 4
41 SHELL	718.77	0.	1358.47	3673956.9	
79 EXTR	712.60	722.70	1358.47	326721.3	
					PACKING NO 1
					SQRT P/V = 16.123
46 LO NO 1	83.16	562.80	1312.29	3408.0	C = 374.646
					SQRT P/V = 3.394
47 LO NO 2	13.63	543.10	1308.00	2068.6	C = 775.546
					SQRT P/V = 0.558
100 LO NO 3	0.	0.	0.	563.9	C = 2117.000
					EXPAND TO EXHAUST
49 EXH	384.30	566.80	1289.21	3692951.8	
80 EXTR	384.30	566.80	1289.21	319656.0	
50 TO RHT	384.30	566.80	1289.21	3373295.8	
					REHEATER 1
BEFORE LO	0.08	0.	1525.33	0.	
37 ENTRY					
84 AFTER LO	354.00	1001.30	1525.29	3375577.0	PCTDP = 7.884
					EXPAND TO BOWL
51 ENTRY	346.92	1000.05	1524.83	3387566.6	
125 ENTRY	359.51	757.60	1396.77	11989.6	
					EXP TO STG 11
52 SHELL	157.60	0.	1419.01	3238281.5	
53 EXTR	156.00	803.30	1429.02	149285.1	
					PACKING NO 3
					SQRT P/V = 3.211
57 LO NO 1	13.63	627.10	1348.40	1237.9	C = 1146.047
					SQRT P/V = 0.536
58 LO NO 2	13.63	641.10	1355.17	1314.7	C = 4555.333
					SQRT P/V = 0.533
100 LO NO 3	0.	0.	0.	563.9	C = 2117.000
					SQRT P/V = 0.
100 LO NO 4	0.	0.	0.	563.9	C = 2117.000

TL	PRESS	TEMP	ENTH	FLOW	
					EXPAND TO EXHAUST
56 EXH	81.02	621.20	1341.35	2910221.7	
55 EXTR	82.83	623.60	1342.42	324379.4	
					EXPAND TO BOWL
59 ENTRY	81.02	621.20	1341.35	2910221.7	
					EXP TO STG 15
61 SHELL	44.64	0.	1282.30	2825494.2	
60 EXTR	44.19	530.10	1299.28	84727.4	
					EXP TO STG 16
63 SHELL	27.27	0.	1237.67	2648608.2	
62 EXTR	26.95	425.50	1250.49	176886.0	
					EXP TO STG 18
65 SHELL	7.96	0.	1144.85	2558119.1	
64 EXTR	7.86	245.60	1168.78	90489.1	
					EXP TO STG 19
107 SHELL	3.48	0.	1093.58	2497391.5	
106 EXTR	3.46	0.	1094.42	60727.6	
					CONDENSER
					SHAFT 1
108 TB EXH	1.51	115.92	1059.2922	2497391.5	LEVL = -5031.0
76 ENTRY	0.	0.	0.	283268.5	
22 ENTRY	7.51	164.60	132.57	352102.6	
122 DRAIN	0.	0.	0.	3137793.6	
					GENERATOR 1
					SHAFT 1

MEASURED LOAD = 592031.0 PF = 0.991 H2 = 58.00
SHAFT 1 KW = 601607.5 FL =4353.0 GL = 5223.5

TEST CYCLE HEAT BALANCE

P E R F O R M A N C E

TRUNKLINE OUTPUT

TL	P	T	H	Q	SV	SP	PV	TR
1	2598.0	508.5	497.3	4060148.	0.0202	0.	0.	-4047.4
2	708.8	720.7	1357.5	326721.	0.9166	504.477	-4.023	216.2
3	708.8	445.8	425.7	326721.	0.0193	0.	4.400	0.
4	2598.0	441.4	422.3	4060148.	0.	0.	0.	0.
5	376.8	566.0	1289.4	319656.	1.5086	438.791	-2.609	127.2
6	376.8	371.1	344.4	646377.	0.0182	0.	6.000	0.
7	2598.0	365.1	341.3	4060148.	0.	0.	0.	0.
8	155.7	800.9	1427.8	149285.	4.7626	361.381	-3.719	439.5
9	155.7	321.7	292.3	795662.	0.0177	0.	5.400	0.
10	2728.4	316.3	291.3	4060148.	0.0174	0.	0.	0.
11	0.	0.	0.	4021693.	0.	0.	0.	0.
12	80.2	617.9	1339.8	182251.	7.9129	312.204	778.400	305.7
13	89.0	272.8	241.9	3044764.	0.0172	0.	0.	0.
14	131.8	272.8	242.0	3044764.	0.0172	1.014	0.	131.8
15	43.5	514.7	1291.9	84727.	13.2309	272.313	-0.487	242.4
16	43.5	246.3	214.9	84727.	0.0170	0.	3.000	0.
17	131.8	243.3	212.0	3044764.	0.	0.	0.	0.
18	26.0	414.9	1245.5	176886.	19.8773	242.229	-1.071	172.7
19	26.0	185.7	153.8	261613.	0.0165	0.	7.100	0.
20	131.8	178.6	146.9	3044764.	0.	0.	0.	0.
21	7.5	238.6	1165.6	90489.	55.0083	180.006	1.406	58.6
22	7.5	164.6	132.6	352103.	0.0164	0.	18.500	0.
23	131.8	146.1	114.4	3044764.	0.	0.	0.	0.
24	1500.0	246.5	218.1	0.	0.0169	0.	0.	0.
25	3.4	0.	1094.4	60728.	0.	146.922	0.822	-146.9
26	171.0	125.1	93.5	3044764.	0.0162	0.	0.	0.
27	0.	0.	0.	3137793.	0.	0.	0.	0.
28	0.	0.	0.	16805.	0.	0.	0.	0.
29	0.	0.	0.	37770.	0.	0.	0.	0.
30	0.	0.	0.	54575.	0.	0.	0.	0.
31	2835.9	300.4	275.3	0.	0.0173	0.	0.	0.
33	0.	0.	0.	3137793.	0.	0.	0.	0.
34	0.	0.	0.	-4047.	0.	0.	0.	0.
35	2728.4	316.3	291.3	4060148.	0.0174	0.	0.	0.
36	2399.8	1007.2	1465.7	4056100.	0.3239	1465.676	86.079	0.
37	354.2	888.6	1465.7	2281.	2.2175	0.780	12.638	55.8
38	0.	0.	0.	2518.	0.	0.	0.	199.3
39	2399.8	0.	1465.7	4051301.	0.3239	0.	86.079	0.
40	1235.5	849.5	1409.0	4014276.	0.5748	135.303	46.362	0.
41	718.8	0.	1358.5	3673957.	0.9054	506.828	28.175	828.4
42	84.1	641.0	1351.0	9648.	7.7125	0.779	3.302	0.0
43	13.7	638.5	1353.9	3386.	47.7318	0.	0.535	1196.3
45	0.	0.	0.	25035.	0.	0.	0.	0.
46	83.2	562.8	1312.3	3408.	7.2177	0.703	3.394	374.6
47	13.6	543.1	1308.0	2069.	43.7136	0.	0.558	775.5
48	0.	0.	0.	3698992.	0.	0.	0.	0.
49	384.3	566.8	1289.2	3692952.	1.4783	440.698	16.123	0.
50	384.3	566.8	1289.2	3373296.	0.	0.	0.	0.
51	346.9	1000.1	1524.8	3387567.	2.4682	0.	11.859	0.

TL	P	T	H	Q	SV	SP	PV	TR
52	157.6	0.	1419.0	3238282.	4.6515	362.797	5.821	782.2
53	156.0	803.3	1429.0	149285.	4.7628	361.534	5.723	0.
54	81.0	621.2	1341.3	3234601.	7.8559	0.	3.211	0.
55	82.8	623.6	1342.4	324379.	7.7001	314.452	0.	0.
56	81.0	621.2	1341.3	2910222.	7.8559	312.917	0.	0.
57	13.6	627.1	1348.4	1238.	47.4065	0.	0.536	1146.0
58	13.6	641.1	1355.2	1315.	48.0213	0.	0.533	4555.3
59	81.0	621.2	1341.3	2910222.	7.8559	0.	3.211	0.
60	44.2	530.1	1299.3	84727.	13.2263	273.323	1.828	0.
61	44.6	0.	1282.3	2825494.	12.6739	274.292	1.877	1064.1
62	27.0	425.5	1250.5	176886.	19.4038	244.258	1.179	0.
63	27.3	0.	1237.7	2648608.	18.6886	245.363	1.208	1084.7
64	7.9	245.6	1168.8	90489.	53.0936	182.061	0.385	0.
65	8.0	0.	1144.8	2558119.	48.8779	183.152	0.404	1053.2
66	13.4	612.0	1341.1	8173.	47.4053	0.	0.	0.
67	80.2	315.0	1184.7	0.	5.4836	0.	0.	0.
68	1.8	480.0	1279.1	0.	302.4288	0.	0.	0.
69	1.6	563.9	1318.8	0.	387.7559	0.	0.	0.
70	1.6	563.9	1318.8	2353.	387.7559	0.	0.	0.
71	0.	0.	1465.7	0.	0.	0.	0.	0.
72	0.	0.	0.	778.	0.	0.	0.	0.
73	0.	0.	0.	-5031.	0.	0.	0.	0.
75	0.	0.	0.	4789.	0.	0.	0.	0.
76	0.	0.	0.	283268.	0.	0.	0.	0.
79	712.6	722.7	1358.5	326721.	0.9134	505.075	27.932	0.
80	384.3	566.8	1289.2	319656.	0.	0.	0.	0.
81	13.4	612.0	1341.1	0.	47.5471	0.	0.	0.
82	0.	0.	0.	3373296.	0.	0.	0.	0.
83	80.2	312.2	1183.1	205.	0.	0.	0.	0.
84	354.0	1001.3	1525.3	3375577.	2.4187	7.884	12.098	796.7
86	0.	0.	0.	93029.	0.	0.	0.	0.
88	0.	0.	0.	2353.	0.	0.	0.	0.
90	110.1	312.5	282.7	0.	0.0176	0.	0.	0.
91	114.8	247.7	216.4	1149759.	0.0170	0.647	0.	114.8
95	1.5	115.9	1046.8	2497392.	212.0179	1059.292	3.074	440.9
99	0.	0.	0.	6204.	0.	0.	0.	0.
100	0.	0.	0.	564.	0.	0.	0.	2117.0
104	2598.0	508.5	497.3	4075897.	0.0202	1.028	0.	2598.0
106	3.5	0.	1094.4	60728.	100.7990	147.072	0.185	0.
107	3.5	0.	1093.6	2497392.	100.2007	0.	0.186	1108.1
108	1.5	115.9	1059.3	2497392.	226.3461	1059.292	3.074	-5031.0
109	0.	0.	247.5	1945421.	0.	0.	0.	0.
111	80.2	312.5	282.6	5171452.	5.4615	0.	-0.296	0.
112	0.	0.	1409.0	37025.	0.	0.	0.	0.
113	0.	0.	0.	4000678.	0.	0.	0.115E 19	0.
114	474.8	123.5	92.7	14413.	0.0162	0.624	0.	474.8
115	474.8	123.5	92.7	8053.	0.0162	0.624	0.	474.8
116	474.8	123.5	92.7	26462.	0.0162	0.623	0.	474.8
117	474.8	123.5	92.7	18791.	0.0162	0.660	0.	474.8
118	474.8	123.5	92.7	0.	0.0162	0.	0.	0.
119	474.8	123.5	92.7	25311.	0.0162	0.660	0.	474.8
120	0.	0.	0.	4800.	0.	0.	0.	0.
122	0.	0.	0.	3137794.	0.	0.	0.	0.
123	3.4	127.2	95.2	63081.	0.0162	0.	2.100	0.
125	359.5	757.6	1396.8	11990.	1.9516	0.628	0.	350.7
130	0.	0.	0.	155184.	0.	0.	0.	0.
131	81.4	617.9	1339.7	77380.	7.7968	1.018	0.	81.4
132	81.4	617.6	1339.5	77804.	7.7916	1.019	0.	81.4
133	0.	0.	0.	154620.	0.	0.	0.	0.
201	0.1	0.	1525.3	0.	0.	236.117	0.	0.

TEST CYCLE HEAT BALANCE

VALVE POINT VWO	05/13/87	TEST POINT 04
INTERMOUNTAIN PWR PROJECT		UNIT #2
820000. KW	TC6F-30 IN LSB	TURBINE NO 270T151
2400. PSIG	1000./ 1000. F	2.300 IN HG ABS

CALCULATED USING ASME STEAM TABLES

COMBINED TURBINE-CYCLE PERFORMANCE

	TEST CONDITIONS	* RATED CONDITIONS
TOTAL LOAD	859850.	858986.
HEAT RATE	7875.4	7883.3
THROTTLE FLOW	6220163.	6281116.

TURBINE THERMAL PERFORMANCE

	HIGH PRESS TB		REHEAT TB		
			IP TB		LP TB
	THROTTLE	COLD RHT	INLET	EXH	EXH
PRESS	2394.00	571.20	526.10	118.90	3.809
TEMP	1000.80	623.00	1008.54	623.60	123.63
ENTH	1461.62	1307.52	1524.17	1340.15	1036.53
ENTR	1.5339		1.7343	1.7497	
EFF	87.890		91.778		93.662

ABSCISSA PHPX/PT=0.2386 P1STSTG/PT=0.8046 VAN= 515.2

THRU FLOW PERFORMANCE OF CONDENSING SECTION SHAFT NO 1

	TOTAL TB ENERGY BALANCE		LP TB ENERGY BALANCE	
	RHT TB	LP TB	RHT TB	LP TB
AE	520.63	327.60		
H ELEP	1036.53		1036.53	
H UEEP	1045.20		1045.20	
EFF ELEP	93.66	92.68	93.66	92.68
EFF UEEP	92.00	90.03	92.00	90.03
VAN	515.24		515.24	

* LOAD AND HEAT RATE AT RATED POWER FACTOR AND H2 PRESS. FLOW AT RATED THROTTLE PRESS. OF 2412.2 PSIA AND TEMP. OF 1000 F.

T G L PERFORMANCE OF CONDENSING SECTION SHAFT NO 1

	TOTAL TB ENERGY BALANCE		LP TB ENERGY BALANCE	
	RHT TB	LP TB	RHT TB	LP TB
H ELEP	1038.88		1038.88	
H UEEP	1047.54		1047.54	
EFF ELEP	93.21	91.96	93.21	91.96
EFF UEEP	91.55	89.32	91.55	89.32
VAN	516.51		516.51	

STAGE FLOW FUNCTION

STG NO	SHELL PRESS	ONE VEL HD	PCT DELTA P	FLANGE PRESS	NOZ AREA	Q/AP H FLG	QFS	Q/AP H SHL
1	1926.20	0.	0.	0.	86.6	0.	6159187.	1006.3
4	1088.56	4.272	1.24	1075.10	157.4	850.2	5560286.	844.9
RH 1	526.10	0.	0.	0.	350.2	0.	5041443.	799.8
8	515.58	0.	0.	0.	350.2	0.	5059466.	818.9
11	234.73	0.820	1.12	232.10	711.2	791.8	4825868.	782.1
15	118.90	0.	0.	0.	807.6	0.	4304371.	1129.1
15	65.64	0.289	1.28	64.80	1414.8	1089.6	4164668.	1064.6
16	39.97	0.191	1.39	39.42	2021.4	1105.0	3882181.	1082.1
18	11.70	0.058	1.44	11.53	6018.0	1086.5	3739758.	1046.4
19	5.03	0.020	1.13	4.97	12096.0	1125.8	3622591.	1119.5

F E E D W A T E R   C Y C L E

TL	PRESS	TEMP	ENTH	FLOW		
					HEATER	8
4 FW IN	2762.80	479.10	463.91	6224686.7	CLOSED	
2 EXTR	1065.00	792.10	1381.58	580635.6	TD =	0.4
3 DRAIN	1065.00	486.30	471.76	580635.6	DC =	7.2
					HEATER	7
7 FW IN	2762.80	395.20	373.10	6224686.7	CLOSED	
5 EXTR	558.00	622.00	1307.96	551437.6	TD =	-0.6
6 DRAIN	558.00	404.00	379.76	1132073.2	DC =	8.8
3 ENTRY	1065.00	486.30	471.76	580635.6		
					HEATER	6
10 FW IN	2911.50	345.80	321.88	6224686.7	CLOSED	
8 EXTR	230.30	807.20	1427.95	233597.1	TD =	-1.4
9 DRAIN	230.30	353.50	325.58	1365670.3	DC =	7.7
6 ENTRY	558.00	404.00	379.76	1132073.2		
					PUMP	
11 FW IN	0.	0.	0.	6180136.6		
86 SEAL INJ	0.	0.	0.	110300.1		
30 SEAL RET	0.	0.	0.	65750.0		
32 LEAKAGE	0.	0.	0.	0.		
24 EXTR	1500.00	295.40	267.69	0.		
35 FW OUT	2911.50	345.80	321.88	6224686.7		
					HEATER	5
13 FW IN	127.90	296.20	265.92	4534595.4	OPEN	
12 EXTR	118.70	624.10	1340.41	280170.6	STO =	0.
111 DRAIN	118.70	340.50	311.78	7090343.3	SC =	-0.1
109 ENTRY	0.	0.	276.69	2275877.0		
					HEATER	4
17 FW IN	174.90	264.40	233.51	4534595.7	CLOSED	
15 EXTR	63.55	520.30	1292.84	139702.6	TD =	0.3
16 DRAIN	63.55	269.10	238.08	139702.6	DC =	4.7
					HEATER	3
20 FW IN	174.90	196.30	164.74	4534595.7	CLOSED	
18 EXTR	38.11	418.70	1245.78	282487.1	TD =	-0.1
19 DRAIN	38.11	205.50	173.68	422189.7	DC =	9.2
16 ENTRY	63.55	269.10	238.08	139702.6		
					HEATER	2
23 FW IN	174.90	160.60	128.97	4534595.7	CLOSED	
21 EXTR	11.09	236.80	1163.62	142423.2	TD =	1.8
22 DRAIN	11.09	168.10	136.08	564612.9	DC =	7.5
19 ENTRY	38.11	205.50	173.68	422189.7		

TL		PRESS	TEMP	ENTH	FLOW		
						STM SEAL REG	
88	FLOW TO	0.	0.	0.	3936.1	CALCULATED	
70	TDV	3.15	651.90	1361.01	3821.2	TO HEATER	
68	TDV	0.29	480.00	1279.24	114.9	TO CONDENSER	
	NOT CODED FOR MU		MEAS TOTAL FLOW =		0.		
						HEATER	1
26	FW IN	222.70	129.70	98.21	4534595.7	CLOSED	
25	EXTR	4.88	0.	1091.45	117166.9	TD =	0.6
123	DRAIN	4.88	134.80	102.76	685601.1	DC =	5.1
22	ENTRY	11.09	168.10	136.08	564612.9		
70	ENTRY	3.15	651.90	1361.01	3821.2		
						PUMP	
33	FW IN	0.	0.	0.	4644895.8		
87	LEAKAGE	0.	0.	0.	0.		
27	FW OUT	0.	0.	0.	4644895.8		
						FW TO BOILER	
1	FW IN	2762.80	551.90	548.78	6224686.7	S+L =	-4523.

T U R B I N E E X P A N S I O N

TL		PRESS	TEMP	ENTH	FLOW		
						MAIN STEAM LINE	
71	EXIT	0.	0.	1461.62	0.		
36	THROTTLE	2394.00	1000.80	1461.62	6220163.4		
						VALVE STEM LKG	
						SQRT P/V =	86.150
37	LO NO 1	526.30	892.55	1461.62	2790.9	C =	55.578
						SQRT P/V =	18.853
38	LO NO 2	0.	0.	0.	1997.1	C =	105.928
						EXP TO STG	1
40	SHELL	1926.20	938.50	1437.26	6159186.8		
112	EXTR	0.	0.	1437.26	56188.6		
						PACKING NO	2
						SQRT P/V =	.115E 19
42	LO NO 1	123.86	688.00	1372.30	13628.6	C =	0.000
						SQRT P/V =	4.770
43	LO NO 2	15.20	686.10	1376.99	4032.0	C =	971.961
						SQRT P/V =	0.582
100	LO NO 3	0.	0.	0.	604.5	C =	2057.052

TL	PRESS	TEMP	ENTH	FLOW	
				EXP TO STG	4
41 SHELL	1088.56	0.	1382.37	5560286.2	
79 EXTR	1075.10	794.20	1382.37	580635.6	
				PACKING NO	1
				SQRT P/V =	23.538
46 LO NO 1	122.51	605.70	1330.94	4483.2	C = 355.283
				SQRT P/V =	4.908
47 LO NO 2	15.09	584.70	1327.85	3275.0	C = 790.423
				SQRT P/V =	0.606
100 LO NO 3	0.	0.	0.	604.5	C = 2057.052
				EXPAND TO EXHAUST	
49 EXH	571.20	623.00	1307.52	5590089.5	
80 EXTR	571.20	623.00	1307.52	551437.6	
50 TO RHT	571.20	623.00	1307.52	5038651.9	
				REHEATER	1
BEFORE LO	0.08	0.	1524.56	0.	
37 ENTRY					
84 AFTER LO	526.10	1009.20	1524.53	5041442.9	PCTDP = 7.896
				EXPAND TO BOWL	
51 ENTRY	515.58	1007.97	1524.17	5059465.5	
125 ENTRY	533.80	822.60	1424.08	18022.6	
				EXP TO STG	11
52 SHELL	234.73	0.	1419.48	4825868.4	
53 EXTR	232.10	808.80	1428.70	233597.1	
				PACKING NO	3
				SQRT P/V =	4.720
57 LO NO 1	15.05	636.40	1352.81	1783.3	C = 1063.375
				SQRT P/V =	0.590
58 LO NO 2	15.08	647.70	1358.29	2027.1	C = 5488.745
				SQRT P/V =	0.588
100 LO NO 3	0.	0.	0.	604.5	C = 2057.052
				SQRT P/V =	0.
100 LO NO 4	0.	0.	0.	604.5	C = 2057.052

TL	PRESS	TEMP	ENTH	FLOW	
					EXPAND TO EXHAUST
56 EXH	118.90	623.60	1340.15	4304370.8	
55 EXTR	122.10	626.90	1341.60	516478.1	
					EXPAND TO BOWL
59 ENTRY	118.90	623.60	1340.15	4304370.8	
					EXP TO STG 15
61 SHELL	65.64	0.	1282.19	4164668.2	
60 EXTR	64.80	531.20	1298.10	139702.6	
					EXP TO STG 16
63 SHELL	39.97	0.	1237.49	3882181.1	
62 EXTR	39.42	426.70	1249.50	282487.1	
					EXP TO STG 18
65 SHELL	11.70	0.	1145.04	3739757.9	
64 EXTR	11.53	239.50	1164.76	142423.2	
					EXP TO STG 19
107 SHELL	5.03	0.	1092.13	3622591.0	
106 EXTR	4.97	0.	1091.45	117166.9	

TL	PRESS	TEMP	ENTH	FLOW	
					CONDENSER SHAFT 1
108 TB EXH	1.87	123.63	1045.2040	3622591.0	LEVL = -4823.0
76 ENTRY	0.	0.	0.	1017482.3	
122 DRAIN	0.	0.	0.	4644896.3	
					GENERATOR 1 SHAFT 1

MEASURED LOAD = 859850.0 PF = 0.989 H2 = 64.00
SHAFT 1 KW = 871730.1 FL =4353.0 GL = 7527.1

TEST CYCLE HEAT BALANCE

P E R F O R M A N C E

TRUNKLINE OUTPUT

TL	P	T	H	Q	SV	SP	PV	TR
1	2762.8	551.9	548.8	6224687.	0.0212	0.	0.	-4523.3
2	1065.0	792.1	1381.6	580636.	0.6357	552.279	0.379	239.8
3	1065.0	486.3	471.8	580636.	0.0200	0.	7.200	0.
4	2762.8	479.1	463.9	6224687.	0.	0.	0.	0.
5	558.0	622.0	1308.0	551438.	1.0566	478.464	-0.636	143.5
6	558.0	404.0	379.8	1132073.	0.0187	0.	8.800	0.
7	2762.8	395.2	373.1	6224687.	0.	0.	0.	0.
8	230.3	807.2	1427.9	233597.	3.2174	393.810	-1.390	413.4
9	230.3	353.5	325.6	1365670.	0.0180	0.	7.700	0.
10	2911.5	345.8	321.9	6224687.	0.0177	0.	0.	0.
11	0.	0.	0.	6180137.	0.	0.	0.	0.
12	118.7	624.1	1340.4	280171.	5.3481	340.448	0.	283.7
13	127.9	296.2	265.9	4534595.	0.0174	0.	0.	0.
14	174.9	296.2	266.0	4534596.	0.0174	1.014	0.	174.9
15	63.6	520.3	1292.8	139703.	9.0660	296.486	0.286	223.8
16	63.6	269.1	238.1	139703.	0.0172	0.	4.700	0.
17	174.9	264.4	233.5	4534596.	0.	0.	0.	0.
18	38.1	418.7	1245.8	282487.	13.5632	264.340	-0.060	154.4
19	38.1	205.5	173.7	422190.	0.0167	0.	9.200	0.
20	174.9	196.3	164.7	4534596.	0.	0.	0.	0.
21	11.1	236.8	1163.6	142423.	37.0413	198.140	1.840	38.7
22	11.1	168.1	136.1	564613.	0.0164	0.	7.500	0.
23	174.9	160.6	129.0	4534596.	0.	0.	0.	0.
24	1500.0	295.4	267.7	0.	0.0173	0.	0.	0.
25	4.9	0.	1091.5	117167.	0.	161.176	0.576	-161.2
26	222.7	129.7	98.2	4534596.	0.0162	0.	0.	0.
27	0.	0.	0.	4644896.	0.	0.	0.	0.
28	0.	0.	0.	18646.	0.	0.	0.	0.
29	0.	0.	0.	47104.	0.	0.	0.	0.
30	0.	0.	0.	65750.	0.	0.	0.	0.
31	2923.9	333.9	309.7	0.	0.0176	0.	0.	0.
33	0.	0.	0.	4644896.	0.	0.	0.	0.
34	0.	0.	0.	-4523.	0.	0.	0.	0.
35	2911.5	345.8	321.9	6224687.	0.0177	0.	0.	0.
36	2394.0	1000.8	1461.6	6220163.	0.3226	1461.622	86.150	0.
37	526.3	892.6	1461.6	2791.	1.4807	0.780	18.853	55.6
38	0.	0.	0.	1997.	0.	0.	0.	105.9
39	2394.0	0.	1461.6	6215375.	0.3226	0.	86.150	0.
40	1926.2	938.5	1437.3	6159187.	0.3856	146.478	70.678	0.
41	1088.6	0.	1382.4	5560286.	0.6227	555.375	41.812	844.9
42	123.9	688.0	1372.3	13629.	5.4431	0.779	4.770	0.0
43	15.2	686.1	1377.0	4032.	44.8245	0.	0.582	972.0
45	0.	0.	0.	38166.	0.	0.	0.	0.
46	122.5	605.7	1330.9	4483.	5.0854	0.703	4.908	355.3
47	15.1	584.7	1327.8	3275.	41.1273	0.	0.606	790.4
48	0.	0.	0.	5598452.	0.	0.	0.	0.
49	571.2	623.0	1307.5	5590090.	1.0310	480.943	23.538	0.
50	571.2	623.0	1307.5	5038652.	0.	0.	0.	0.
51	515.6	1008.0	1524.2	5059466.	1.6573	0.	17.642	0.

TL	P	T	H	Q	SV	SP	PV	TR
52	234.7	0.	1419.5	4825868.	3.1180	395.860	8.676	782.1
53	232.1	808.8	1428.7	233597.	3.1963	394.484	8.522	0.
54	118.9	623.6	1340.1	4820849.	5.3364	0.	4.720	0.
55	122.1	626.9	1341.6	516478.	5.2110	342.572	0.	0.
56	118.9	623.6	1340.1	4304371.	5.3364	340.575	0.	0.
57	15.0	636.4	1352.8	1783.	43.2953	0.	0.590	1063.4
58	15.1	647.7	1358.3	2027.	43.6577	0.	0.588	5488.7
59	118.9	623.6	1340.1	4304371.	5.3364	0.	4.720	0.
60	64.8	531.2	1298.1	139703.	8.9928	297.774	2.684	0.
61	65.6	0.	1282.2	4164668.	8.5857	298.730	2.765	1064.6
62	39.4	426.7	1249.5	282487.	13.2325	266.369	1.726	0.
63	40.0	0.	1237.5	3882181.	12.6906	267.383	1.775	1082.1
64	11.5	239.5	1164.8	142423.	35.7583	200.017	0.568	0.
65	11.7	0.	1145.0	3739758.	33.1685	201.139	0.594	1046.4
66	14.7	634.4	1351.9	9178.	44.1865	0.	0.	0.
67	118.7	343.2	1191.8	0.	3.7835	0.	0.	0.
68	0.3	480.0	1279.2	115.	1903.7423	0.	0.	0.
69	3.1	651.9	1361.0	1230.	210.3186	0.	0.	0.
70	3.1	651.9	1361.0	3821.	210.3186	0.	0.	0.
71	0.	0.	1461.6	0.	0.	0.	0.	0.
73	0.	0.	0.	-4823.	0.	0.	0.	0.
75	0.	0.	0.	5552.	0.	0.	0.	0.
76	0.	0.	0.	1017482.	0.	0.	0.	0.
79	1075.1	794.2	1382.4	580636.	0.6305	553.443	41.292	0.
80	571.2	623.0	1307.5	551438.	0.	0.	0.	0.
81	14.7	634.4	1351.9	0.	44.1865	0.	0.	0.
82	0.	0.	0.	5038652.	0.	0.	0.	0.
83	118.7	340.4	1190.2	300.	0.	0.	0.	0.
84	526.1	1009.2	1524.5	5041443.	1.6241	7.896	17.998	799.8
86	0.	0.	0.	110300.	0.	0.	0.	0.
88	0.	0.	0.	3936.	0.	0.	0.	0.
90	148.7	340.5	311.8	0.	0.0179	0.	0.	0.
91	139.3	234.7	203.3	910207.	0.0169	0.647	0.	139.3
95	1.9	123.6	1036.5	3622591.	170.8108	1045.204	3.809	515.2
99	0.	0.	0.	6650.	0.	0.	0.	0.
100	0.	0.	0.	604.	0.	0.	0.	2057.1
104	2762.8	551.9	548.8	6240937.	0.0212	1.028	0.	2762.8
106	5.0	0.	1091.5	117167.	71.0138	161.990	0.265	0.
107	5.0	0.	1092.1	3622591.	70.2487	0.	0.268	1119.5
108	1.9	123.6	1045.2	3622591.	185.0160	1045.204	3.809	-4823.0
109	0.	0.	276.7	2275877.	0.	0.	0.	0.
111	118.7	340.5	311.8	7090343.	3.7666	0.	-0.052	0.
112	0.	0.	1437.3	56189.	0.	0.	0.	0.
113	0.	0.	0.	6140922.	0.	0.	0.115E 19	0.
114	410.1	128.8	97.8	14783.	0.0162	0.624	0.	410.1
115	410.1	128.8	97.8	9013.	0.0162	0.624	0.	410.1
116	410.1	128.8	97.8	28198.	0.0162	0.623	0.	410.1
117	410.1	128.8	97.8	13915.	0.0162	0.660	0.	410.1
118	410.1	128.8	97.8	22392.	0.0162	0.660	0.	410.1
119	410.1	128.8	97.8	21999.	0.0162	0.660	0.	410.1
120	0.	0.	0.	4788.	0.	0.	0.	0.
122	0.	0.	0.	4644896.	0.	0.	0.	0.
123	4.9	134.8	102.8	685601.	0.0163	0.	5.100	0.
125	533.8	822.6	1424.1	18023.	1.3741	0.628	0.	519.8
130	0.	0.	0.	254419.	0.	0.	0.	0.
131	119.9	624.0	1340.3	124889.	5.2932	1.019	0.	119.9
132	119.7	623.7	1340.1	129531.	5.3006	1.019	0.	119.7
133	0.	0.	0.	253815.	0.	0.	0.	0.
201	0.1	0.	1524.6	0.	0.	217.041	0.	0.

TEST CYCLE HEAT BALANCE

VALVE POINT 3RD VL	05/14/87	TEST POINT 05
INTERMOUNTAIN PWR PROJECT		UNIT #2
820000. KW	TC6F-30 IN LSB	TURBINE NO 270T151
2400. PSIG	1000./ 1000. F	2.300 IN HG ABS

CALCULATED USING ASME STEAM TABLES

COMBINED TURBINE-CYCLE PERFORMANCE

	TEST CONDITIONS	* RATED CONDITIONS
TOTAL LOAD	785980.	785201.
HEAT RATE	7858.4	7866.2
THROTTLE FLOW	5570279.	5627468.

TURBINE THERMAL PERFORMANCE

	HIGH PRESS TB		REHEAT TB		
			IP TB		LP TB
	THROTTLE	COLD RHT	INLET	EXH	EXH
PRESS	2393.80	514.80	475.00	107.50	3.403
TEMP	1001.50	606.10	1005.50	622.90	119.54
ENTH	1462.09	1301.65	1524.01	1340.52	1036.93
ENTR	1.5343		1.7452	1.7610	
EFF	86.181		91.583		93.569

ABSCISSA PHPX/PT=0.2151 P1STSTG/PT=0.7161 VAN= 522.6

THRU FLOW PERFORMANCE OF CONDENSING SECTION SHAFT NO 1

	TOTAL TB ENERGY BALANCE		LP TB ENERGY BALANCE	
	RHT TB	LP TB	RHT TB	LP TB
AE	520.56	327.90		
H ELEP	1036.93		1036.93	
H UEEP	1045.45		1045.45	
EFF ELEP	93.57	92.59	93.57	92.59
EFF UEEP	91.93	89.99	91.93	89.99
VAN	522.60		522.60	

* LOAD AND HEAT RATE AT RATED POWER FACTOR AND H2 PRESS. FLOW AT RATED THROTTLE PRESS. OF 2412.2 PSIA AND TEMP. OF 1000 F.

A05-1

T G L PERFORMANCE OF CONDENSING SECTION   SHAFT NO 1

	TOTAL TB ENERGY BALANCE		LP TB ENERGY BALANCE	
	RHT TB	LP TB	RHT TB	LP TB
H ELEP	1039.18		1039.18	
H UEEP	1047.69		1047.69	
EFF ELEP	93.14	91.90	93.14	91.90
EFF UEEP	91.50	89.30	91.50	89.30
VAN	523.84		523.84	

STAGE FLOW FUNCTION

STG NO	SHELL PRESS	ONE VEL HD	PCT DELTA P	FLANGE PRESS	NOZ AREA	Q/AP H FLG	QFS	Q/AP H SHL
1	1714.30	0.	0.	0.	86.6	0.	5515140.	1005.3
4	975.78	3.487	1.13	964.80	157.4	846.4	4998137.	841.6
RH 1	475.00	0.	0.	0.	350.2	0.	4546814.	799.0
8	465.50	0.	0.	0.	350.2	0.	4562958.	818.0
11	211.53	0.727	1.10	209.20	711.2	792.6	4354230.	783.1
15	107.50	0.	0.	0.	807.6	0.	3898551.	1131.7
15	59.41	0.244	1.19	58.70	1414.8	1091.7	3776322.	1067.5
16	36.23	0.165	1.32	35.75	2021.4	1107.7	3526673.	1085.9
18	10.60	0.051	1.40	10.45	6018.0	1092.9	3400059.	1051.2
19	4.55	0.017	1.06	4.50	12096.0	1130.0	3296859.	1124.0

TL		PRESS	TEMP	ENTH	FLOW		

F E E D W A T E R   C Y C L E

TL		PRESS	TEMP	ENTH	FLOW		
						HEATER	8
4	FW IN	2679.90	469.20	452.85	5573373.4	CLOSED	
2	EXTR	955.00	771.40	1374.49	500222.7	TD =	-1.5
3	DRAIN	955.00	475.40	459.20	500222.7	DC =	6.2
						HEATER	7
7	FW IN	2679.90	387.20	364.57	5573373.4	CLOSED	
5	EXTR	503.00	605.10	1302.02	480036.8	TD =	-1.6
6	DRAIN	503.00	395.00	370.01	980259.6	DC =	7.8
3	ENTRY	955.00	475.40	459.20	500222.7		
						HEATER	6
10	FW IN	2826.30	337.80	313.50	5573373.4	CLOSED	
8	EXTR	207.70	805.10	1427.80	208728.4	TD =	-2.2
9	DRAIN	207.70	344.70	316.32	1188987.9	DC =	6.9
6	ENTRY	503.00	395.00	370.01	980259.6		
						PUMP	
11	FW IN	0.	0.	0.	5527238.3		
86	SEAL INJ	0.	0.	0.	109560.8		
30	SEAL RET	0.	0.	0.	63425.7		
32	LEAKAGE	0.	0.	0.	0.		
24	EXTR	1500.00	276.90	248.86	0.		
35	FW OUT	2826.30	337.80	313.50	5573373.4		
						HEATER	5
13	FW IN	116.40	290.10	259.64	4086605.4	OPEN	
12	EXTR	107.30	622.40	1340.28	252175.2	STO =	257.4
111	DRAIN	107.30	333.10	304.04	6488791.0	SC =	-0.1
109	ENTRY	0.	0.	267.06	2150540.7		
						HEATER	4
17	FW IN	161.80	259.00	228.00	4086606.2	CLOSED	
15	EXTR	57.64	519.10	1292.77	122229.4	TD =	0.0
16	DRAIN	57.64	263.10	231.95	122229.4	DC =	4.1
						HEATER	3
20	FW IN	161.80	191.90	160.29	4086606.2	CLOSED	
18	EXTR	34.52	418.00	1245.90	249649.0	TD =	-0.5
19	DRAIN	34.52	200.50	168.64	371878.4	DC =	8.6
16	ENTRY	57.64	263.10	231.95	122229.4		
						HEATER	2
23	FW IN	161.80	156.60	124.94	4086606.2	CLOSED	
21	EXTR	10.05	237.60	1164.34	126613.3	TD =	1.5
22	DRAIN	10.05	163.70	131.67	498491.7	DC =	7.1
19	ENTRY	34.52	200.50	168.64	371878.4		

TL		PRESS	TEMP	ENTH	FLOW		
						STM SEAL REG	
88	FLOW TO	0.	0.	0.	3190.9	CALCULATED	
70	TDV	4.54	676.10	1372.67	3190.9	TO HEATER	
68	TDV	2.03	480.00	1279.07	0.	TO CONDENSER	
	NOT CODED FOR MU		MEAS TOTAL FLOW =		0.		
						HEATER	1
26	FW IN	206.70	126.40	94.88	4086606.2	CLOSED	
25	EXTR	4.42	0.	1092.40	103200.7	TD =	0.4
123	DRAIN	4.42	131.10	99.06	604883.3	DC =	4.7
22	ENTRY	10.05	163.70	131.67	498491.7		
70	ENTRY	4.54	676.10	1372.67	3190.9		
						PUMP	
33	FW IN	0.	0.	0.	4196167.0		
87	LEAKAGE	0.	0.	0.	0.		
27	FW OUT	0.	0.	0.	4196167.0		
						FW TO BOILER	
1	FW IN	2679.90	540.50	535.00	5573373.4	S+L =	-3095.

T U R B I N E   E X P A N S I O N

TL		PRESS	TEMP	ENTH	FLOW		
						MAIN STEAM LINE	
71	EXIT	0.	0.	1462.09	0.		
36	THROTTLE	2393.80	1001.50	1462.09	5570278.9		
						VALVE STEM LKG	
						SQRT P/V =	86.110
37	LO NO 1	475.20	890.02	1462.09	2650.5	C =	55.599
						SQRT P/V =	17.013
38	LO NO 2	0.	0.	0.	2137.1	C =	125.620
						EXP TO STG	1
40	SHELL	1714.30	912.20	1428.45	5515140.0		
112	EXTR	0.	0.	1428.45	50351.2		
						PACKING NO	2
						SQRT P/V =	.115E 19
42	LO NO 1	112.39	674.00	1365.89	12404.9	C =	0.000
						SQRT P/V =	4.353
43	LO NO 2	16.85	670.50	1369.29	3760.9	C =	1005.031
						SQRT P/V =	0.650
100	LO NO 3	0.	0.	0.	614.5	C =	1879.144

TL	PRESS	TEMP	ENTH	FLOW	
					EXP TO STG 4
41 SHELL	975.78	0.	1374.59	4998137.0	
79 EXTR	964.80	772.40	1374.59	500222.7	
					PACKING NO 1
					SQRT P/V = 21.336
46 LO NO 1	111.24	592.80	1325.23	4437.6	C = 381.695
					SQRT P/V = 4.482
47 LO NO 2	16.79	572.30	1321.77	3091.7	C = 826.983
					SQRT P/V = 0.678
100 LO NO 3	0.	0.	0.	614.5	C = 1879.144
					EXPAND TO EXHAUST
49 EXH	514.80	606.10	1301.65	5024200.4	
80 EXTR	514.80	606.10	1301.65	480036.8	
50 TO RHT	514.80	606.10	1301.65	4544163.6	
					REHEATER 1
BEFORE LO	0.08	0.	1524.43	0.	
37 ENTRY					
84 AFTER LO	475.00	1006.20	1524.39	4546814.1	PCTDP = 7.731
					EXPAND TO BOWL
51 ENTRY	465.50	1004.99	1524.01	4562958.1	
125 ENTRY	481.83	808.00	1418.32	16144.0	
					EXP TO STG 11
52 SHELL	211.53	0.	1419.38	4354229.8	
53 EXTR	209.20	806.40	1428.41	208728.4	
					PACKING NO 3
					SQRT P/V = 4.266
57 LO NO 1	16.76	634.10	1351.60	1705.0	C = 1135.963
					SQRT P/V = 0.657
58 LO NO 2	16.77	646.40	1357.56	1911.6	C = 4777.700
					SQRT P/V = 0.654
100 LO NO 3	0.	0.	0.	614.5	C = 1879.144
					SQRT P/V = 0.
100 LO NO 4	0.	0.	0.	614.5	C = 1879.144

TL	PRESS	TEMP	ENTH	FLOW	
					EXPAND TO EXHAUST
56 EXH	107.50	622.90	1340.52	3898551.2	
55 EXTR	110.80	626.10	1341.91	450833.0	
					EXPAND TO BOWL
59 ENTRY	107.50	622.90	1340.52	3898551.2	
					EXP TO STG 15
61 SHELL	59.41	0.	1282.79	3776321.7	
60 EXTR	58.70	531.10	1298.56	122229.4	
					EXP TO STG 16
63 SHELL	36.23	0.	1238.23	3526672.8	
62 EXTR	35.75	426.50	1249.87	249649.0	
					EXP TO STG 18
65 SHELL	10.60	0.	1145.74	3400059.5	
64 EXTR	10.45	242.30	1166.43	126613.3	
					EXP TO STG 19
107 SHELL	4.55	0.	1092.98	3296858.8	
106 EXTR	4.50	0.	1092.40	103200.7	
					CONDENSER
					SHAFT 1
108 TB EXH	1.67	119.54	1045.4450	3296858.8	LEVL = -3624.8
76 ENTRY	0.	0.	0.	895683.4	
122 DRAIN	0.	0.	0.	4196166.9	
					GENERATOR 1
					SHAFT 1

MEASURED LOAD = 785980.0 PF = 1.000 H2 = 64.00
SHAFT 1 KW = 797091.0 FL =4353.0 GL = 6758.0

TEST CYCLE HEAT BALANCE

P E R F O R M A N C E

TRUNKLINE OUTPUT

TL	P	T	H	Q	SV	SP	PV	TR
1	2679.9	540.5	535.0	5573373.	0.0210	0.	0.	-3094.5
2	955.0	771.4	1374.5	500223.	0.7004	539.024	-1.476	232.4
3	955.0	475.4	459.2	500223.	0.0198	0.	6.200	0.
4	2679.9	469.2	452.8	5573373.	0.	0.	0.	0.
5	503.0	605.1	1302.0	480037.	1.1586	467.626	-1.574	137.5
6	503.0	395.0	370.0	980260.	0.0185	0.	7.800	0.
7	2679.9	387.2	364.6	5573373.	0.	0.	0.	0.
8	207.7	805.1	1427.8	208728.	3.5676	384.983	-2.217	420.1
9	207.7	344.7	316.3	1188988.	0.0179	0.	6.900	0.
10	2826.3	337.8	313.5	5573373.	0.0176	0.	0.	0.
11	0.	0.	0.	5527238.	0.	0.	0.	0.
12	107.3	622.4	1340.3	252175.	5.9163	332.958	257.400	289.4
13	116.4	290.1	259.6	4086605.	0.0174	0.	0.	0.
14	161.8	290.1	259.7	4086606.	0.0174	1.014	0.	161.8
15	57.6	519.1	1292.8	122229.	9.9952	290.101	0.001	229.0
16	57.6	263.1	232.0	122229.	0.0171	0.	4.100	0.
17	161.8	259.0	228.0	4086606.	0.	0.	0.	0.
18	34.5	418.0	1245.9	249649.	14.9788	258.473	-0.527	159.5
19	34.5	200.5	168.6	371878.	0.0166	0.	8.600	0.
20	161.8	191.9	160.3	4086606.	0.	0.	0.	0.
21	10.0	237.6	1164.3	126613.	40.9622	193.445	1.545	44.2
22	10.0	163.7	131.7	498492.	0.0164	0.	7.100	0.
23	161.8	156.6	124.9	4086606.	0.	0.	0.	0.
24	1500.0	276.9	248.9	0.	0.0171	0.	0.	0.
25	4.4	0.	1092.4	103201.	0.	157.046	0.446	-157.0
26	206.7	126.4	94.9	4086606.	0.0162	0.	0.	0.
27	0.	0.	0.	4196167.	0.	0.	0.	0.
28	0.	0.	0.	18171.	0.	0.	0.	0.
29	0.	0.	0.	45255.	0.	0.	0.	0.
30	0.	0.	0.	63426.	0.	0.	0.	0.
31	2833.0	303.5	278.5	0.	0.0173	0.	0.	0.
33	0.	0.	0.	4196167.	0.	0.	0.	0.
34	0.	0.	0.	-3095.	0.	0.	0.	0.
35	2826.3	337.8	313.5	5573373.	0.0176	0.	0.	0.
36	2393.8	1001.5	1462.1	5570279.	0.3228	1462.094	86.110	0.
37	475.2	890.0	1462.1	2650.	1.6419	0.780	17.013	55.6
38	0.	0.	0.	2137.	0.	0.	0.	125.6
39	2393.8	0.	1462.1	5565491.	0.3228	0.	86.110	0.
40	1714.3	912.2	1428.5	5515140.	0.4272	143.173	63.347	0.
41	975.8	0.	1374.6	4998137.	0.6855	542.134	37.730	841.6
42	112.4	674.0	1365.9	12405.	5.9298	0.779	4.353	0.0
43	16.8	670.5	1369.3	3761.	39.8733	0.	0.650	1005.0
45	0.	0.	0.	34207.	0.	0.	0.	0.
46	111.2	592.8	1325.2	4438.	5.5382	0.703	4.482	381.7
47	16.8	572.3	1321.8	3092.	36.5099	0.	0.678	827.0
48	0.	0.	0.	5032344.	0.	0.	0.	0.
49	514.8	606.1	1301.7	5024200.	1.1309	470.025	21.336	0.
50	514.8	606.1	1301.7	4544164.	0.	0.	0.	0.
51	465.5	1005.0	1524.0	4562958.	1.8358	0.	15.928	0.

TL	P	T	H	Q	SV	SP	PV	TR
52	211.5	0.	1419.4	4354230.	3.4608	386.937	7.818	783.1
53	209.2	806.4	1428.4	208728.	3.5455	385.592	7.681	0.
54	107.5	622.9	1340.5	4349384.	5.9080	0.	4.266	0.
55	110.8	626.1	1341.9	450833.	5.7472	335.322	0.	0.
56	107.5	622.9	1340.5	3898551.	5.9080	333.095	0.	0.
57	16.8	634.1	1351.6	1705.	38.7868	0.	0.657	1136.0
58	16.8	646.4	1357.6	1912.	39.2031	0.	0.654	4777.7
59	107.5	622.9	1340.5	3898551.	5.9080	0.	4.266	0.
60	58.7	531.1	1298.6	122229.	9.9384	291.284	2.430	0.
61	59.4	0.	1282.8	3776322.	9.5024	292.221	2.500	1067.5
62	35.8	426.5	1249.9	249649.	14.6044	260.537	1.565	0.
63	36.2	0.	1238.2	3526673.	14.0353	261.582	1.607	1085.9
64	10.5	242.3	1166.4	126613.	39.6572	195.297	0.513	0.
65	10.6	0.	1145.7	3400059.	36.6907	196.413	0.537	1051.2
66	16.5	624.4	1346.9	9415.	39.0946	0.	0.	0.
67	107.3	335.8	1190.1	0.	4.1644	0.	0.	0.
68	2.0	480.0	1279.1	0.	276.2814	0.	0.	0.
69	4.5	676.1	1372.7	750.	148.8754	0.	0.	0.
70	4.5	676.1	1372.7	3191.	148.8754	0.	0.	0.
71	0.	0.	1462.1	0.	0.	0.	0.	0.
72	0.	0.	0.	257.	0.	0.	0.	0.
73	0.	0.	0.	-3625.	0.	0.	0.	0.
75	0.	0.	0.	5728.	0.	0.	0.	0.
76	0.	0.	0.	895683.	0.	0.	0.	0.
79	964.8	772.4	1374.6	500223.	0.6934	540.251	37.303	0.
80	514.8	606.1	1301.7	480037.	0.	0.	0.	0.
81	16.5	624.4	1346.9	0.	39.0946	0.	0.	0.
82	0.	0.	0.	4544164.	0.	0.	0.	0.
83	107.3	333.0	1188.4	273.	0.	0.	0.	0.
84	475.0	1006.2	1524.4	4546814.	1.7990	7.731	16.249	799.0
86	0.	0.	0.	109561.	0.	0.	0.	0.
88	0.	0.	0.	3191.	0.	0.	0.	0.
90	137.3	333.1	304.1	0.	0.0178	0.	0.	0.
91	131.7	237.5	206.1	961553.	0.0169	0.647	0.	131.7
95	1.7	119.5	1036.9	3296859.	190.3695	1045.445	3.403	522.6
99	0.	0.	0.	6760.	0.	0.	0.	0.
100	0.	0.	0.	615.	0.	0.	0.	1879.1
104	2679.9	540.5	535.0	5578025.	0.0210	1.028	0.	2679.9
106	4.5	0.	1092.4	103201.	78.1635	157.828	0.240	0.
107	4.5	0.	1093.0	3296859.	77.3689	0.	0.242	1124.0
108	1.7	119.5	1045.4	3296859.	205.7008	1045.445	3.403	-3624.8
109	0.	0.	267.1	2150541.	0.	0.	0.	0.
111	107.3	333.1	304.0	6488791.	4.1459	0.	-0.142	0.
112	0.	0.	1428.5	50351.	0.	0.	0.	0.
113	0.	0.	0.	5498360.	0.	0.	0.115E 19	0.
114	434.6	125.1	94.2	14857.	0.0162	0.624	0.	434.6
115	434.6	125.1	94.2	8663.	0.0162	0.624	0.	434.6
116	434.6	125.1	94.2	27616.	0.0162	0.623	0.	434.6
117	434.6	125.1	94.2	15126.	0.0162	0.660	0.	434.6
118	434.6	125.1	94.2	21097.	0.0162	0.660	0.	434.6
119	434.6	125.1	94.2	22202.	0.0162	0.660	0.	434.6
120	0.	0.	0.	4788.	0.	0.	0.	0.
122	0.	0.	0.	4196167.	0.	0.	0.	0.
123	4.4	131.1	99.1	604883.	0.0163	0.	4.700	0.
125	481.8	808.0	1418.3	16144.	1.5086	0.628	0.	469.5
130	0.	0.	0.	215500.	0.	0.	0.	0.
131	108.3	622.4	1340.2	105879.	5.8608	1.018	0.	108.3
132	108.5	622.1	1340.1	109621.	5.8481	1.019	0.	108.5
133	0.	0.	0.	214886.	0.	0.	0.	0.
201	0.1	0.	1524.4	0.	0.	222.775	0.	0.

TEST CYCLE HEAT BALANCE

VALVE POINT VWO	05/14/87	TEST POINT 06
INTERMOUNTAIN PWR PROJECT		UNIT #2
820000. KW	TC6F-30 IN LSB	TURBINE NO 270T151
2400. PSIG	1000./ 1000. F	2.300 IN HG ABS

CALCULATED USING ASME STEAM TABLES

COMBINED TURBINE-CYCLE PERFORMANCE

	TEST CONDITIONS	* RATED CONDITIONS
TOTAL LOAD	860755.	859887.
HEAT RATE	7847.1	7855.0
THROTTLE FLOW	6224013.	6269949.

TURBINE THERMAL PERFORMANCE

	HIGH PRESS TB		REHEAT TB IP TB		LP TB
	THROTTLE	COLD RHT	INLET	EXH	EXH
PRESS	2394.20	571.50	527.60	118.60	3.599
TEMP	996.50	619.30	1002.45	618.80	121.56
ENTH	1458.75	1305.18	1520.83	1337.76	1031.30
ENTR	1.5320		1.7317	1.7478	
EFF	88.016		91.464		93.775

ABSCISSA PHPX/PT=0.2387 P1STSTG/PT=0.8050 VAN= 539.1

THRU FLOW PERFORMANCE OF CONDENSING SECTION SHAFT NO 1

	TOTAL TB ENERGY BALANCE RHT TB	LP TB	LP TB ENERGY BALANCE RHT TB	LP TB
AE	522.03	329.59		
H ELEP	1031.30		1031.30	
H UEEP	1039.33		1039.33	
EFF ELEP	93.77	92.98	93.77	92.98
EFF UEEP	92.24	90.54	92.24	90.54
VAN	539.15		539.15	

* LOAD AND HEAT RATE AT RATED POWER FACTOR AND H2 PRESS. FLOW AT RATED THROTTLE PRESS. OF 2412.2 PSIA AND TEMP. OF 1000 F.

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T G L PERFORMANCE OF CONDENSING SECTION SHAFT NO 1

	TOTAL TB ENERGY BALANCE		LP TB ENERGY BALANCE	
	RHT TB	LP TB	RHT TB	LP TB
H ELEP	1033.75		1033.75	
H UEEP	1041.79		1041.79	
EFF ELEP	93.31	92.24	93.31	92.24
EFF UEEP	91.77	89.80	91.77	89.80
VAN	540.55		540.55	

STAGE FLOW FUNCTION

STG NO	SHELL PRESS	ONE VEL HD	PCT DELTA P	FLANGE PRESS	NOZ AREA	Q/AP H FLG	QFS	Q/AP H SHL
1	1927.30	0.	0.	0.	86.6	0.	6162994.	1003.8
4	1088.87	4.278	1.24	1075.40	157.4	848.2	5561745.	842.9
RH 1	527.60	0.	0.	0.	350.2	0.	5041928.	795.8
8	517.05	0.	0.	0.	350.2	0.	5059875.	814.8
11	234.23	0.822	1.12	231.60	711.2	791.8	4825774.	781.3
15	118.60	0.	0.	0.	807.6	0.	4300146.	1128.2
15	65.42	0.291	1.29	64.58	1414.8	1089.3	4159730.	1063.0
16	39.88	0.190	1.39	39.33	2021.4	1103.3	3877277.	1079.3
18	11.69	0.059	1.45	11.52	6018.0	1081.0	3733837.	1044.3
19	5.01	0.022	1.26	4.94	12096.0	1126.0	3610182.	1118.8

TL		PRESS	TEMP	ENTH	FLOW		

F E E D W A T E R   C Y C L E

					HEATER		8
4	FW IN	2733.90	478.80	463.56	6228975.6	CLOSED	
2	EXTR	1062.60	788.10	1379.22	582439.2	TD =	0.4
3	DRAIN	1062.60	486.00	471.41	582439.2	DC =	7.2
					HEATER		7
7	FW IN	2733.90	395.00	372.85	6228975.6	CLOSED	
5	EXTR	557.00	618.30	1305.74	552154.5	TD =	-0.5
6	DRAIN	557.00	403.70	379.43	1134593.8	DC =	8.7
3	ENTRY	1062.60	486.00	471.41	582439.2		
					HEATER		6
10	FW IN	2908.20	345.60	321.66	6228975.6	CLOSED	
8	EXTR	229.90	802.10	1425.33	234100.5	TD =	-1.3
9	DRAIN	229.90	353.30	325.37	1368694.3	DC =	7.7
6	ENTRY	557.00	403.70	379.43	1134593.8		
					PUMP		
11	FW IN	0.	0.	0.	6187291.2		
86	SEAL INJ	0.	0.	0.	107115.2		
30	SEAL RET	0.	0.	0.	65430.7		
32	LEAKAGE	0.	0.	0.	0.		
24	EXTR	1500.00	220.20	191.69	0.		
35	FW OUT	2908.20	345.60	321.66	6228975.6		
					HEATER		5
13	FW IN	127.80	296.10	265.82	4534707.4	OPEN	
12	EXTR	118.30	619.60	1338.18	284958.8	STO =	769.6
111	DRAIN	118.30	340.40	311.68	7116503.7	SC =	-0.2
109	ENTRY	0.	0.	275.04	2297906.8		
					HEATER		4
17	FW IN	174.50	264.20	233.31	4534707.8	CLOSED	
15	EXTR	63.38	515.80	1290.64	140416.3	TD =	0.2
16	DRAIN	63.38	269.00	237.97	140416.3	DC =	4.8
					HEATER		3
20	FW IN	174.50	196.20	164.64	4534707.8	CLOSED	
18	EXTR	37.94	414.80	1243.90	282452.6	TD =	-0.1
19	DRAIN	37.94	205.30	173.48	422868.9	DC =	9.1
16	ENTRY	63.38	269.00	237.97	140416.3		
					HEATER		2
23	FW IN	174.50	160.30	128.67	4534707.8	CLOSED	
21	EXTR	11.05	233.90	1162.26	143440.6	TD =	1.8
22	DRAIN	11.05	167.90	135.88	566309.5	DC =	7.6
19	ENTRY	37.94	205.30	173.48	422868.9		

TL		PRESS	TEMP	ENTH	FLOW		
						STM SEAL REG	
88	FLOW TO	0.	0.	0.	4497.0	CALCULATED	
70	TDV	5.03	654.10	1361.97	4497.0	TO HEATER	
68	TDV	2.12	480.00	1279.06	0.	TO CONDENSER	
	NOT CODED FOR MU		MEAS TOTAL FLOW =		0.		
						HEATER	1
26	FW IN	222.20	127.60	96.11	4534707.8	CLOSED	
25	EXTR	4.83	0.	1088.93	123654.9	TD =	0.5
123	DRAIN	4.83	133.00	100.96	694461.4	DC =	5.4
22	ENTRY	11.05	167.90	135.88	566309.5		
70	ENTRY	5.03	654.10	1361.97	4497.0		
						PUMP	
33	FW IN	0.	0.	0.	4641822.9		
87	LEAKAGE	0.	0.	0.	0.		
27	FW OUT	0.	0.	0.	4641822.9		
						FW TO BOILER	
1	FW IN	2733.90	551.60	548.44	6228975.6	S+L =	-4963.

T U R B I N E   E X P A N S I O N

TL		PRESS	TEMP	ENTH	FLOW		
						MAIN STEAM LINE	
71	EXIT	0.	0.	1458.75	0.		
36	THROTTLE	2394.20	996.50	1458.75	6224012.6		
						VALVE STEM LKG	
					SQRT	P/V =	86.356
37	LO NO 1	527.80	887.33	1458.75	2800.9	C =	55.449
					SQRT	P/V =	18.949
38	LO NO 2	0.	0.	0.	1987.5	C =	104.887
						EXP TO STG	1
40	SHELL	1927.30	934.00	1434.28	6162994.1		
112	EXTR	0.	0.	1434.28	56230.2		
						PACKING NO	2
					SQRT	P/V =	.115E 19
42	LO NO 1	123.45	690.00	1373.33	13922.1	C =	0.000
					SQRT	P/V =	4.750
43	LO NO 2	17.08	682.60	1375.18	4281.1	C =	1028.969
					SQRT	P/V =	0.655
100	LO NO 3	0.	0.	0.	606.4	C =	1834.023

TL	PRESS	TEMP	ENTH	FLOW	
					EXP TO STG 4
41 SHELL	1088.87	0.	1379.87	5561745.3	
79 EXTR	1075.40	790.20	1379.87	582439.2	
					PACKING NO 1
					SQRT P/V = 23.609
46 LO NO 1	122.05	602.40	1329.31	4686.3	C = 370.502
					SQRT P/V = 4.898
47 LO NO 2	16.96	582.40	1326.61	3454.4	C = 829.131
					SQRT P/V = 0.682
100 LO NO 3	0.	0.	0.	606.4	C = 1834.023
					EXPAND TO EXHAUST
49 EXH	571.50	619.30	1305.18	5591282.1	
80 EXTR	571.50	619.30	1305.18	552154.5	
50 TO RHT	571.50	619.30	1305.18	5039127.5	
					REHEATER 1
BEFORE LO	0.08	0.	1521.22	0.	
37 ENTRY					
84 AFTER LO	527.60	1003.10	1521.18	5041928.4	PCTDP = 7.682
					EXPAND TO BOWL
51 ENTRY	517.05	1001.87	1520.83	5059874.8	
125 ENTRY	534.80	818.10	1421.60	17946.4	
					EXP TO STG 11
52 SHELL	234.23	0.	1415.77	4825774.3	
53 EXTR	231.60	803.60	1426.04	234100.5	
					PACKING NO 3
					SQRT P/V = 4.719
57 LO NO 1	16.95	635.50	1352.26	1904.7	C = 1106.108
					SQRT P/V = 0.664
58 LO NO 2	16.95	645.70	1357.21	2102.6	C = 4990.290
					SQRT P/V = 0.661
100 LO NO 3	0.	0.	0.	606.4	C = 1834.023
					SQRT P/V = 0.
100 LO NO 4	0.	0.	0.	606.4	C = 1834.023

TL	PRESS	TEMP	ENTH	FLOW	
					EXPAND TO EXHAUST
56 EXH	118.60	618.80	1337.76	4300146.2	
55 EXTR	121.60	622.20	1339.27	520407.8	
					EXPAND TO BOWL
59 ENTRY	118.60	618.80	1337.76	4300146.2	
					EXP TO STG 15
61 SHELL	65.42	0.	1278.95	4159729.9	
60 EXTR	64.58	526.60	1295.85	140416.3	
					EXP TO STG 16
63 SHELL	39.88	0.	1234.56	3877277.3	
62 EXTR	39.33	422.40	1247.42	282452.6	
					EXP TO STG 18
65 SHELL	11.69	0.	1142.71	3733836.7	
64 EXTR	11.52	233.80	1162.06	143440.6	
					EXP TO STG 19
107 SHELL	5.01	0.	1089.63	3610181.8	
106 EXTR	4.94	0.	1088.93	123654.9	

TL	PRESS	TEMP	ENTH	FLOW	
					CONDENSER
					SHAFT 1
108 TB EXH	1.77	121.56	1039.3263	3610181.8	LEVL = -6032.3
76 ENTRY	0.	0.	0.	1025609.2	
122 DRAIN	0.	0.	0.	4641823.3	
					GENERATOR 1
					SHAFT 1

MEASURED LOAD = 860755.0 PF = 0.989 H2 = 64.00
SHAFT 1 KW = 872642.3 FL =4353.0 GL = 7534.3

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IP14_005145

TEST CYCLE HEAT BALANCE

P E R F O R M A N C E

TRUNKLINE OUTPUT

TL	P	T	H	Q	SV	SP	PV	TR
1	2733.9	551.6	548.4	6228976.	0.0212	0.	0.	-4963.0
2	1062.6	788.1	1379.2	582439.	0.6343	552.001	0.401	236.1
3	1062.6	486.0	471.4	582439.	0.0200	0.	7.200	0.
4	2733.9	478.8	463.6	6228976.	0.	0.	0.	0.
5	557.0	618.3	1305.7	552155.	1.0535	478.275	-0.525	140.0
6	557.0	403.7	379.4	1134594.	0.0187	0.	8.700	0.
7	2733.9	395.0	372.8	6228976.	0.	0.	0.	0.
8	229.9	802.1	1425.3	234101.	3.2092	393.660	-1.340	408.4
9	229.9	353.3	325.4	1368694.	0.0180	0.	7.700	0.
10	2908.2	345.6	321.7	6228976.	0.0177	0.	0.	0.
11	0.	0.	0.	6187291.	0.	0.	0.	0.
12	118.3	619.6	1338.2	284959.	5.3428	340.195	769.600	279.4
13	127.8	296.1	265.8	4534707.	0.0174	0.	0.	0.
14	174.5	296.1	265.9	4534708.	0.0174	1.014	0.	174.5
15	63.4	515.8	1290.6	140416.	9.0467	296.309	0.209	219.5
16	63.4	269.0	238.0	140416.	0.0172	0.	4.800	0.
17	174.5	264.2	233.3	4534708.	0.	0.	0.	0.
18	37.9	414.8	1243.9	282453.	13.5611	264.072	-0.128	150.7
19	37.9	205.3	173.5	422869.	0.0167	0.	9.100	0.
20	174.5	196.2	164.6	4534708.	0.	0.	0.	0.
21	11.1	233.9	1162.3	143441.	37.0078	197.975	1.775	35.9
22	11.1	167.9	135.9	566310.	0.0164	0.	7.600	0.
23	174.5	160.3	128.7	4534708.	0.	0.	0.	0.
24	1500.0	220.2	191.7	0.	0.0167	0.	0.	0.
25	4.8	0.	1088.9	123655.	0.	160.795	0.495	-160.8
26	222.2	127.6	96.1	4534708.	0.0162	0.	0.	0.
27	0.	0.	0.	4641823.	0.	0.	0.	0.
28	0.	0.	0.	18500.	0.	0.	0.	0.
29	0.	0.	0.	46930.	0.	0.	0.	0.
30	0.	0.	0.	65431.	0.	0.	0.	0.
31	2920.2	285.0	259.9	0.	0.0171	0.	0.	0.
33	0.	0.	0.	4641823.	0.	0.	0.	0.
34	0.	0.	0.	-4963.	0.	0.	0.	0.
35	2908.2	345.6	321.7	6228976.	0.0177	0.	0.	0.
36	2394.2	996.5	1458.8	6224013.	0.3210	1458.752	86.356	0.
37	527.8	887.3	1458.8	2801.	1.4699	0.780	18.949	55.4
38	0.	0.	0.	1988.	0.	0.	0.	104.9
39	2394.2	0.	1458.8	6219224.	0.3210	0.	86.356	0.
40	1927.3	934.0	1434.3	6162994.	0.3834	145.752	70.896	0.
41	1088.9	0.	1379.9	5561745.	0.6196	555.410	41.920	842.9
42	123.4	690.0	1373.3	13922.	5.4716	0.779	4.750	0.0
43	17.1	682.6	1375.2	4281.	39.7595	0.	0.655	1029.0
45	0.	0.	0.	38284.	0.	0.	0.	0.
46	122.0	602.4	1329.3	4686.	5.0881	0.703	4.898	370.5
47	17.0	582.4	1326.6	3454.	36.5003	0.	0.682	829.1
48	0.	0.	0.	5600029.	0.	0.	0.	0.
49	571.5	619.3	1305.2	5591282.	1.0253	480.999	23.609	0.
50	571.5	619.3	1305.2	5039128.	0.	0.	0.	0.
51	517.0	1001.9	1520.8	5059875.	1.6450	0.	17.733	0.

TL	P	T	H	Q	SV	SP	PV	TR
52	234.2	0.	1415.8	4825774.	3.1054	395.673	8.685	781.3
53	231.6	803.6	1426.0	234101.	3.1892	394.297	8.522	0.
54	118.6	618.8	1337.8	4820554.	5.3248	0.	4.719	0.
55	121.6	622.2	1339.3	520408.	5.2086	342.262	0.	0.
56	118.6	618.8	1337.8	4300146.	5.3248	340.385	0.	0.
57	17.0	635.5	1352.3	1905.	38.4006	0.	0.664	1106.1
58	17.0	645.7	1357.2	2103.	38.7611	0.	0.661	4990.3
59	118.6	618.8	1337.8	4300146.	5.3249	0.	4.719	0.
60	64.6	526.6	1295.9	140416.	8.9798	297.549	2.682	0.
61	65.4	0.	1278.9	4159730.	8.5519	298.504	2.766	1063.0
62	39.3	422.4	1247.4	282453.	13.1955	266.231	1.726	0.
63	39.9	0.	1234.6	3877277.	12.6280	267.246	1.777	1079.3
64	11.5	233.8	1162.1	143441.	35.4836	199.975	0.570	0.
65	11.7	0.	1142.7	3733837.	33.1151	201.097	0.594	1044.3
66	16.6	633.0	1351.1	9233.	39.1454	0.	0.	0.
67	118.3	343.1	1191.9	0.	3.7967	0.	0.	0.
68	2.1	480.0	1279.1	0.	264.2691	0.	0.	0.
69	5.0	654.1	1362.0	1533.	131.7884	0.	0.	0.
70	5.0	654.1	1362.0	4497.	131.7884	0.	0.	0.
71	0.	0.	1458.8	0.	0.	0.	0.	0.
72	0.	0.	0.	770.	0.	0.	0.	0.
73	0.	0.	0.	-6032.	0.	0.	0.	0.
75	0.	0.	0.	5595.	0.	0.	0.	0.
76	0.	0.	0.	1025609.	0.	0.	0.	0.
79	1075.4	790.2	1379.9	582439.	0.6275	553.477	41.399	0.
80	571.5	619.3	1305.2	552155.	0.	0.	0.	0.
81	16.6	633.0	1351.1	0.	39.1454	0.	0.	0.
82	0.	0.	0.	5039128.	0.	0.	0.	0.
83	118.3	340.2	1190.1	300.	0.	0.	0.	0.
84	527.6	1003.1	1521.2	5041928.	1.6120	7.682	18.091	795.8
86	0.	0.	0.	107115.	0.	0.	0.	0.
88	0.	0.	0.	4497.	0.	0.	0.	0.
90	148.3	340.4	311.7	0.	0.0179	0.	0.	0.
91	139.2	232.3	200.9	929212.	0.0169	0.647	0.	139.2
95	1.8	121.6	1031.3	3610182.	179.3530	1039.326	3.599	539.1
99	0.	0.	0.	6671.	0.	0.	0.	0.
100	0.	0.	0.	606.	0.	0.	0.	1834.0
104	2733.9	551.6	548.4	6248749.	0.0212	1.028	0.	2733.9
106	4.9	0.	1088.9	123655.	71.2111	161.752	0.263	0.
107	5.0	0.	1089.6	3610182.	70.3504	0.	0.267	1118.8
108	1.8	121.6	1039.3	3610182.	195.1488	1039.326	3.599	-6032.3
109	0.	0.	275.0	2297907.	0.	0.	0.	0.
111	118.3	340.4	311.7	7116504.	3.7797	0.	-0.205	0.
112	0.	0.	1434.3	56230.	0.	0.	0.	0.
113	0.	0.	0.	6144185.	0.	0.	0.115E 19	0.
114	411.8	126.6	95.6	14773.	0.0162	0.624	0.	411.8
115	411.8	126.6	95.6	8886.	0.0162	0.624	0.	411.8
116	411.8	126.6	95.6	28048.	0.0162	0.623	0.	411.8
117	411.8	126.6	95.6	13189.	0.0162	0.660	0.	411.8
118	411.8	126.6	95.6	21372.	0.0162	0.660	0.	411.8
119	411.8	126.6	95.6	20847.	0.0162	0.660	0.	411.8
120	0.	0.	0.	4788.	0.	0.	0.	0.
122	0.	0.	0.	4641823.	0.	0.	0.	0.
123	4.8	133.0	101.0	694461.	0.0163	0.	5.400	0.
125	534.8	818.1	1421.6	17946.	1.3659	0.628	0.	521.0
130	0.	0.	0.	254057.	0.	0.	0.	0.
131	119.3	619.2	1337.9	124258.	5.2952	1.019	0.	119.3
132	119.3	619.1	1337.9	129800.	5.2946	1.019	0.	119.3
133	0.	0.	0.	253451.	0.	0.	0.	0.
201	0.1	0.	1521.2	0.	0.	216.039	0.	0.

TEST CYCLE HEAT BALANCE

VALVE POINT 3RD VL	05/15/87	TEST POINT 07
INTERMOUNTAIN PWR PROJECT		UNIT #2
820000. KW	TC6F-30 IN LSB	TURBINE NO 270T151
2400. PSIG	1000./ 1000. F	2.300 IN HG ABS

CALCULATED USING ASME STEAM TABLES

COMBINED TURBINE-CYCLE PERFORMANCE

	TEST CONDITIONS	* RATED CONDITIONS
TOTAL LOAD	775096.	774305.
HEAT RATE	7864.3	7872.3
THROTTLE FLOW	5477861.	5561237.

TURBINE THERMAL PERFORMANCE

	HIGH PRESS TB		REHEAT TB IP TB		LP TB
	THROTTLE	COLD RHT	INLET	EXH	EXH
PRESS	2388.90	507.00	467.60	106.10	3.513
TEMP	1006.60	607.30	1003.98	621.50	120.69
ENTH	1465.64	1303.04	1523.41	1339.91	1038.31
ENTR	1.5369		1.7465	1.7619	
EFF	86.221		91.796		93.757

ABSCISSA PHPX/PT=0.2122 P1STSTG/PT=0.7074 VAN= 501.5

THRU FLOW PERFORMANCE OF CONDENSING SECTION SHAFT NO 1

	TOTAL TB ENERGY BALANCE RHT TB	LP TB	LP TB ENERGY BALANCE RHT TB	LP TB
AE	517.40	324.96		
H ELEP	1038.31		1038.31	
H UEEP	1047.45		1047.45	
EFF ELEP	93.76	92.81	93.76	92.81
EFF UEEP	91.99	90.00	91.99	90.00
VAN	501.48		501.48	

* LOAD AND HEAT RATE AT RATED POWER FACTOR AND H2 PRESS. FLOW AT RATED THROTTLE PRESS. OF 2412.2 PSIA AND TEMP. OF 1000 F.

A07-1

T G L PERFORMANCE OF CONDENSING SECTION . SHAFT NO 1

	TOTAL TB ENERGY BALANCE RHT TB	LP TB	LP TB ENERGY BALANCE RHT TB	LP TB
H ELEP	1040.77		1040.77	
H UEEP	1049.89		1049.89	
EFF ELEP	93.28	92.05	93.28	92.05
EFF UEEP	91.52	89.25	91.52	89.25
VAN	502.78		502.78	

STAGE FLOW FUNCTION

STG NO	SHELL PRESS	ONE VEL HD	PCT DELTA P	FLANGE PRESS	NOZ AREA	Q/AP H FLG	QFS	Q/AP H SHL
1	1689.80	0.	0.	0.	86.6	0.	5432148.	1006.2
4	962.48	3.391	1.11	951.80	157.4	847.5	4926550.	842.8
RH 1	467.60	0.	0.	0.	350.2	0.	4483722.	800.0
8	458.25	0.	0.	0.	350.2	0.	4490995.	817.6
11	208.21	0.722	1.11	205.90	711.2	791.9	4284397.	781.9
15	106.10	0.	0.	0.	807.6	0.	3841718.	1129.2
15	58.58	0.239	1.18	57.89	1414.8	1090.5	3721658.	1064.9
16	35.72	0.160	1.30	35.26	2021.4	1106.9	3477102.	1083.4
18	10.46	0.049	1.36	10.32	6018.0	1092.0	3353727.	1047.6
19	4.51	0.015	0.95	4.46	12096.0	1125.1	3256836.	1119.8

TL	PRESS	TEMP	ENTH	FLOW		

F E E D W A T E R   C Y C L E

TL	PRESS	TEMP	ENTH	FLOW		
					HEATER	8
4 FW IN	2669.20	467.90	451.40	5483310.6	CLOSED	
2 EXTR	943.10	772.80	1375.97	488974.9	TD =	-1.6
3 DRAIN	943.10	473.80	457.37	488974.9	DC =	5.9
					HEATER	7
7 FW IN	2669.20	385.90	363.19	5483310.6	CLOSED	
5 EXTR	495.90	606.20	1303.29	471082.7	TD =	-1.7
6 DRAIN	495.90	393.70	368.61	960057.6	DC =	7.8
3 ENTRY	943.10	473.80	457.37	488974.9		
					HEATER	6
10 FW IN	2754.40	336.30	311.83	5483310.6	CLOSED	
8 EXTR	204.40	802.90	1426.81	206598.3	TD =	-2.3
9 DRAIN	204.40	343.10	314.64	1166655.9	DC =	6.8
6 ENTRY	495.90	393.70	368.61	960057.6		
					PUMP	
11 FW IN	0.	0.	0.	5430703.8		
86 SEAL INJ	0.	0.	0.	117579.8		
30 SEAL RET	0.	0.	0.	64973.0		
32 LEAKAGE	0.	0.	0.	0.		
24 EXTR	1500.00	263.68	235.47	0.		
35 FW OUT	2754.40	336.30	311.83	5483310.6		
					HEATER	5
13 FW IN	114.80	289.30	258.82	4016291.1	OPEN	
12 EXTR	105.80	621.30	1339.83	248542.4	STO =	514.9
111 DRAIN	105.80	332.00	302.89	6403041.8	SC =	-0.1
109 ENTRY	0.	0.	265.32	2138993.9		
					HEATER	4
17 FW IN	160.10	258.20	227.18	4016291.8	CLOSED	
15 EXTR	56.85	518.00	1292.30	120060.2	TD =	-0.1
16 DRAIN	56.85	262.30	231.14	120060.2	DC =	4.1
					HEATER	3
20 FW IN	160.10	191.30	159.69	4016291.8	CLOSED	
18 EXTR	34.09	416.70	1245.33	244555.9	TD =	-0.5
19 DRAIN	34.09	199.80	167.94	364616.1	DC =	8.5
16 ENTRY	56.85	262.30	231.14	120060.2		
					HEATER	2
23 FW IN	160.10	156.30	124.63	4016291.8	CLOSED	
21 EXTR	9.93	237.10	1164.14	123375.0	TD =	1.6
22 DRAIN	9.93	163.30	131.27	487991.1	DC =	7.0
19 ENTRY	34.09	199.80	167.94	364616.1		

TL		PRESS	TEMP	ENTH	FLOW		
						STM SEAL REG	
88	FLOW TO	0.	0.	0.	2751.8	CALCULATED	
70	TDV	4.50	653.00	1361.46	2751.8	TO HEATER	
68	TDV	2.08	480.00	1279.07	0.	TO CONDENSER	
	NOT CODED FOR MU		MEAS TOTAL FLOW =		0.		
						HEATER	1
26	FW IN	204.40	127.60	96.07	4016291.8	CLOSED	
25	EXTR	4.40	0.	1090.98	96890.9	TD =	0.6
123	DRAIN	4.40	132.10	100.06	587633.8	DC =	4.5
22	ENTRY	9.93	163.30	131.27	487991.1		
70	ENTRY	4.50	653.00	1361.46	2751.8		
						PUMP	
33	FW IN	0.	0.	0.	4133871.6		
87	LEAKAGE	0.	0.	0.	0.		
27	FW OUT	0.	0.	0.	4133871.6		
						FW TO BOILER	
1	FW IN	2669.20	539.10	533.32	5483310.6	S+L =	-5449.

T U R B I N E E X P A N S I O N

						MAIN STEAM LINE	
71	EXIT	0.	0.	1465.64	0.		
36	THROTTLE	2388.90	1006.60	1465.64	5477861.3		
						VALVE STEM LKG	
						SQRT P/V =	85.690
37	LO NO 1	467.80	896.16	1465.64	2622.9	C =	55.757
						SQRT P/V =	16.701
38	LO NO 2	0.	0.	0.	2154.9	C =	129.028
						EXP TO STG	1
40	SHELL	1689.80	913.65	1430.35	5432148.4		
112	EXTR	0.	0.	1430.35	40935.1		
						PACKING NO	2
						SQRT P/V =	.115E 19
42	LO NO 1	110.28	676.00	1367.00	12268.1	C =	0.000
						SQRT P/V =	4.268
43	LO NO 2	16.83	674.80	1371.38	3751.4	C =	1020.512
						SQRT P/V =	0.648
100	LO NO 3	0.	0.	0.	603.7	C =	1847.487

TL	PRESS	TEMP	ENTH	FLOW	
					EXP TO STG 4
41 SHELL	962.48	0.	1376.74	4926550.2	
79 EXTR	951.80	774.80	1376.74	488974.9	
					PACKING NO 1
					SQRT P/V = 20.980
46 LO NO 1	109.14	595.80	1326.88	4430.5	C = 382.760
					SQRT P/V = 4.390
47 LO NO 2	16.76	575.70	1323.40	2996.2	C = 820.036
					SQRT P/V = 0.676
100 LO NO 3	0.	0.	0.	603.7	C = 1847.487
					EXPAND TO EXHAUST
49 EXH	507.00	607.30	1303.04	4952182.0	
80 EXTR	507.00	607.30	1303.04	471082.7	
50 TO RHT	507.00	607.30	1303.04	4481099.3	
					REHEATER 1
BEFORE LO	0.08	0.	1523.62	0.	
37 ENTRY					
84 AFTER LO	467.60	1004.30	1523.58	4483722.2	PCTDP = 7.771
					EXPAND TO BOWL
51 ENTRY	458.25	1003.47	1523.41	4490995.1	
125 ENTRY	464.54	804.90	1416.98	7272.9	
					EXP TO STG 11
52 SHELL	208.21	0.	1418.38	4284396.8	
53 EXTR	205.90	804.70	1427.67	206598.3	
					PACKING NO 3
					SQRT P/V = 4.213
57 LO NO 1	16.75	633.50	1351.31	1769.3	C = 1151.765
					SQRT P/V = 0.657
58 LO NO 2	16.75	645.50	1357.13	1875.1	C = 4690.857
					SQRT P/V = 0.654
100 LO NO 3	0.	0.	0.	603.7	C = 1847.487
					SQRT P/V = 0.
100 LO NO 4	0.	0.	0.	603.7	C = 1847.487

TL	PRESS	TEMP	ENTH	FLOW	
					EXPAND TO EXHAUST
56 EXH	106.10	621.50	1339.91	3841718.3	
55 EXTR	108.70	624.80	1341.40	437826.6	
					EXPAND TO BOWL
59 ENTRY	106.10	621.50	1339.91	3841718.3	
					EXP TO STG 15
61 SHELL	58.58	0.	1281.71	3721658.0	
60 EXTR	57.89	530.00	1298.09	120060.2	
					EXP TO STG 16
63 SHELL	35.72	0.	1237.13	3477102.2	
62 EXTR	35.26	425.50	1249.45	244555.9	
					EXP TO STG 18
65 SHELL	10.46	0.	1144.75	3353727.2	
64 EXTR	10.32	242.40	1166.52	123375.0	
					EXP TO STG 19
107 SHELL	4.51	0.	1092.19	3256836.3	
106 EXTR	4.46	0.	1090.98	96890.9	

TL	PRESS	TEMP	ENTH	FLOW	
					CONDENSER
					SHAFT 1
108 TB EXH	1.73	120.69	1047.4478	3256836.3	LEVL = -6234.9
76 ENTRY	0.	0.	0.	870800.2	
122 DRAIN	0.	0.	0.	4133871.4	
					GENERATOR 1
					SHAFT 1

MEASURED LOAD = 775096.0 PF = 1.000 H2 = 62.00
SHAFT 1 KW = 786079.0 FL =4353.0 GL = 6630.0

TEST CYCLE HEAT BALANCE

P E R F O R M A N C E

TRUNKLINE OUTPUT

TL	P	T	H	Q	SV	SP	PV	TR
1	2669.2	539.1	533.3	5483311.	0.0209	0.	0.	-5449.3
2	943.1	772.8	1376.0	488975.	0.7113	537.521	-1.579	235.3
3	943.1	473.8	457.4	488975.	0.0198	0.	5.900	0.
4	2669.2	467.9	451.4	5483311.	0.	0.	0.	0.
5	495.9	606.2	1303.3	471083.	1.1784	466.161	-1.739	140.0
6	495.9	393.7	368.6	960058.	0.0185	0.	7.800	0.
7	2669.2	385.9	363.2	5483311.	0.	0.	0.	0.
8	204.4	802.9	1426.8	206598.	3.6195	383.632	-2.268	419.3
9	204.4	343.1	314.6	1166656.	0.0179	0.	6.800	0.
10	2754.4	336.3	311.8	5483311.	0.0176	0.	0.	0.
11	0.	0.	0.	5430704.	0.	0.	0.	0.
12	105.8	621.3	1339.8	248542.	5.9950	331.926	514.900	289.4
13	114.8	289.3	258.8	4016291.	0.0173	0.	0.	0.
14	160.1	289.3	258.9	4016292.	0.0173	1.014	0.	160.1
15	56.8	518.0	1292.3	120060.	10.1238	289.208	-0.092	228.8
16	56.8	262.3	231.1	120060.	0.0171	0.	4.100	0.
17	160.1	258.2	227.2	4016292.	0.	0.	0.	0.
18	34.1	416.7	1245.3	244556.	15.1464	257.738	-0.462	159.0
19	34.1	199.8	167.9	364616.	0.0166	0.	8.500	0.
20	160.1	191.3	159.7	4016292.	0.	0.	0.	0.
21	9.9	237.1	1164.1	123375.	41.4392	192.869	1.569	44.2
22	9.9	163.3	131.3	487991.	0.0164	0.	7.000	0.
23	160.1	156.3	124.6	4016292.	0.	0.	0.	0.
24	1500.0	263.7	235.5	0.	0.0170	0.	0.	0.
25	4.4	0.	1091.0	96891.	0.	156.876	0.576	-156.9
26	204.4	127.6	96.1	4016292.	0.0162	0.	0.	0.
27	0.	0.	0.	4133872.	0.	0.	0.	0.
28	0.	0.	0.	19570.	0.	0.	0.	0.
29	0.	0.	0.	45403.	0.	0.	0.	0.
30	0.	0.	0.	64973.	0.	0.	0.	0.
31	2759.6	304.0	278.8	0.	0.0173	0.	0.	0.
33	0.	0.	0.	4133872.	0.	0.	0.	0.
34	0.	0.	0.	-5449.	0.	0.	0.	0.
35	2754.4	336.3	311.8	5483311.	0.0176	0.	0.	0.
36	2388.9	1006.6	1465.6	5477861.	0.3253	1465.639	85.690	0.
37	467.8	896.2	1465.6	2623.	1.6771	0.780	16.701	55.8
38	0.	0.	0.	2155.	0.	0.	0.	129.0
39	2388.9	0.	1465.6	5473083.	0.3253	0.	85.690	0.
40	1689.8	913.6	1430.3	5432148.	0.4348	143.743	62.337	0.
41	962.5	0.	1376.7	4926550.	0.6978	540.499	37.138	842.8
42	110.3	676.0	1367.0	12268.	6.0554	0.779	4.268	0.0
43	16.8	674.8	1371.4	3751.	40.0738	0.	0.648	1020.5
45	0.	0.	0.	33662.	0.	0.	0.	0.
46	109.1	595.8	1326.9	4430.	5.6634	0.703	4.390	382.8
47	16.8	575.7	1323.4	2996.	36.6972	0.	0.676	820.0
48	0.	0.	0.	4960212.	0.	0.	0.	0.
49	507.0	607.3	1303.0	4952182.	1.1518	468.444	20.980	0.
50	507.0	607.3	1303.0	4481099.	0.	0.	0.	0.
51	458.2	1003.5	1523.4	4490995.	1.8629	0.	15.686	0.

TL	P	T	H	Q	SV	SP	PV	TR
52	208.2	0.	1418.4	4284397.	3.5076	385.589	7.705	781.9
53	205.9	804.7	1427.7	206598.	3.5982	384.249	7.565	0.
54	106.1	621.5	1339.9	4279545.	5.9789	0.	4.213	0.
55	108.7	624.8	1341.4	437827.	5.8526	333.911	0.	0.
56	106.1	621.5	1339.9	3841718.	5.9789	332.133	0.	0.
57	16.8	633.5	1351.3	1769.	38.7886	0.	0.657	1151.8
58	16.8	645.5	1357.1	1875.	39.2178	0.	0.654	4690.9
59	106.1	621.5	1339.9	3841718.	5.9790	0.	4.213	0.
60	57.9	530.0	1298.1	120060.	10.0674	290.382	2.398	0.
61	58.6	0.	1281.7	3721658.	9.6006	291.316	2.470	1064.9
62	35.3	425.5	1249.4	244556.	14.7921	259.722	1.544	0.
63	35.7	0.	1237.1	3477102.	14.1723	260.771	1.588	1083.4
64	10.3	242.4	1166.5	123375.	40.1673	194.702	0.507	0.
65	10.5	0.	1144.8	3353727.	36.9690	195.817	0.532	1047.6
66	16.5	626.5	1347.9	9795.	39.2425	0.	0.	0.
67	105.8	334.7	1189.8	0.	4.2198	0.	0.	0.
68	2.1	480.0	1279.1	0.	268.7139	0.	0.	0.
69	4.5	653.0	1361.5	631.	147.1380	0.	0.	0.
70	4.5	653.0	1361.5	2752.	147.1380	0.	0.	0.
71	0.	0.	1465.6	0.	0.	0.	0.	0.
72	0.	0.	0.	515.	0.	0.	0.	0.
73	0.	0.	0.	-6235.	0.	0.	0.	0.
75	0.	0.	0.	6173.	0.	0.	0.	0.
76	0.	0.	0.	870800.	0.	0.	0.	0.
79	951.8	774.8	1376.7	488975.	0.7057	538.621	36.724	0.
80	507.0	607.3	1303.0	471083.	0.	0.	0.	0.
81	16.5	626.5	1347.9	0.	39.2425	0.	0.	0.
82	0.	0.	0.	4481099.	0.	0.	0.	0.
83	105.8	331.9	1188.2	271.	0.	0.	0.	0.
84	467.6	1004.3	1523.6	4483722.	1.8255	7.771	16.005	800.0
86	0.	0.	0.	117580.	0.	0.	0.	0.
88	0.	0.	0.	2752.	0.	0.	0.	0.
90	135.8	332.0	303.0	0.	0.0178	0.	0.	0.
91	130.8	237.5	206.1	972338.	0.0169	0.647	0.	130.8
95	1.7	120.7	1038.3	3256836.	184.9225	1047.448	3.513	501.5
99	0.	0.	0.	6641.	0.	0.	0.	0.
100	0.	0.	0.	604.	0.	0.	0.	1847.5
104	2669.2	539.1	533.3	5491047.	0.0209	1.028	0.	2669.2
106	4.5	0.	1091.0	96891.	78.6673	157.485	0.238	0.
107	4.5	0.	1092.2	3256836.	77.9511	0.	0.240	1119.8
108	1.7	120.7	1047.4	3256836.	199.6378	1047.448	3.513	-6234.9
109	0.	0.	265.3	2138994.	0.	0.	0.	0.
111	105.8	332.0	302.9	6403042.	4.2011	0.	-0.074	0.
112	0.	0.	1430.3	40935.	0.	0.	0.	0.
113	0.	0.	0.	5415525.	0.	0.	0.115E 19	0.
114	438.5	126.4	95.5	14848.	0.0162	0.624	0.	438.5
115	438.5	126.4	95.5	14282.	0.0162	0.624	0.	438.5
116	438.5	126.4	95.5	27472.	0.0162	0.623	0.	438.5
117	438.5	126.4	95.5	15749.	0.0162	0.660	0.	438.5
118	438.5	126.4	95.5	22286.	0.0162	0.660	0.	438.5
119	438.5	126.4	95.5	22944.	0.0162	0.660	0.	438.5
120	0.	0.	0.	4778.	0.	0.	0.	0.
122	0.	0.	0.	4133871.	0.	0.	0.	0.
123	4.4	132.1	100.1	587634.	0.0163	0.	4.500	0.
125	464.5	804.9	1417.0	7273.	1.5616	0.628	0.	462.0
130	0.	0.	0.	205983.	0.	0.	0.	0.
131	106.9	621.2	1339.7	101833.	5.9318	1.018	0.	106.9
132	107.1	620.9	1339.5	104150.	5.9188	1.019	0.	107.1
133	0.	0.	0.	205379.	0.	0.	0.	0.
201	0.1	0.	1523.6	0.	0.	220.576	0.	0.

TEST CYCLE HEAT BALANCE

VALVE POINT VWO-OP	05/15/87	TEST POINT 08
INTERMOUNTAIN PWR PROJECT		UNIT #2
820000. KW	TC6F-30 IN LSB	TURBINE NO 270T151
2400. PSIG	1000./ 1000. F	2.300 IN HG ABS

CALCULATED USING ASME STEAM TABLES

COMBINED TURBINE-CYCLE PERFORMANCE

	TEST CONDITIONS	* RATED CONDITIONS
TOTAL LOAD	898356.	898356.
HEAT RATE	7772.3	7772.3
THROTTLE FLOW	6496919.	6281950.

TURBINE THERMAL PERFORMANCE

	HIGH PRESS TB		REHEAT TB		
			IP TB		LP TB
	THROTTLE	COLD RHT	INLET	EXH	EXH
PRESS	2477.14	590.03	544.47	122.65	3.195
TEMP	988.20	612.10	995.81	612.80	117.29
ENTH	1450.32	1299.07	1516.74	1334.47	1020.74
ENTR	1.5228		1.7255	1.7411	
EFF	87.790		91.714		93.902

ABSCISSA PHPX/PT=0.2382 P1STSTG/PT=0.8045 VAN= 616.5

THRU FLOW PERFORMANCE OF CONDENSING SECTION SHAFT NO 1

	TOTAL TB ENERGY BALANCE		LP TB ENERGY BALANCE	
	RHT TB	LP TB	RHT TB	LP TB
AE	528.21	336.94		
H ELEP	1020.74		1020.74	
H UEEP	1028.10		1028.10	
EFF ELEP	93.90	93.11	93.90	93.11
EFF UEEP	92.51	90.93	92.51	90.93
VAN	616.52		616.52	

* LOAD AND HEAT RATE AT RATED POWER FACTOR AND H2 PRESS. FLOW AT RATED THROTTLE PRESS. OF 2412.2 PSIA AND TEMP. OF 1000 F.

A08-1

T G L PERFORMANCE OF CONDENSING SECTION SHAFT NO 1

	TOTAL TB ENERGY BALANCE		LP TB ENERGY BALANCE	
	RHT TB	LP TB	RHT TB	LP TB
H ELEP	1023.00		1023.00	
H UEEP	1030.39		1030.39	
EFF ELEP	93.48	92.44	93.48	92.44
EFF UEEP	92.07	90.25	92.07	90.25
VAN	618.01		618.01	

STAGE FLOW FUNCTION

STG NO	SHELL PRESS	ONE VEL HD	PCT DELTA P	FLANGE PRESS	NOZ AREA	Q/AP H FLG	QFS	Q/AP H SHL
1	1992.87	0.	0.	0.	86.6	0.	6438694.	1007.5
4	1124.35	4.554	1.28	1110.00	157.4	850.9	5801024.	845.5
RH 1	544.47	0.	0.	0.	350.2	0.	5249181.	800.5
8	533.58	0.	0.	0.	350.2	0.	5262602.	818.8
11	242.73	0.849	1.12	240.01	711.2	792.4	5019764.	782.2
15	122.65	0.	0.	0.	807.6	0.	4463988.	1128.8
15	67.63	0.311	1.33	66.73	1414.8	1089.7	4315958.	1063.6
16	41.18	0.202	1.42	40.59	2021.4	1104.1	4019545.	1080.1
18	12.09	0.064	1.53	11.91	6018.0	1071.1	3865914.	1044.7
19	5.14	0.028	1.57	5.06	12096.0	1132.1	3724659.	1123.2

F E E D W A T E R   C Y C L E

TL	PRESS	TEMP	ENTH	FLOW		
					HEATER	8
4 FW IN	2830.00	481.70	466.84	6502076.0	CLOSED	
2 EXTR	1098.85	779.40	1371.87	614860.0	TD =	1.8
3 DRAIN	1098.85	489.30	475.24	614860.0	DC =	7.6
					HEATER	7
7 FW IN	2830.00	397.50	375.61	6502076.0	CLOSED	
5 EXTR	577.10	610.90	1299.40	585006.7	TD =	0.3
6 DRAIN	577.10	406.70	382.70	1199866.7	DC =	9.2
3 ENTRY	1098.85	489.30	475.24	614860.0		
					HEATER	6
10 FW IN	3013.10	348.50	324.83	6502076.0	CLOSED	
8 EXTR	238.20	796.30	1421.99	242838.4	TD =	-0.8
9 DRAIN	238.20	356.50	328.75	1442705.1	DC =	8.0
6 ENTRY	577.10	406.70	382.70	1199866.7		
					PUMP	
11 FW IN	0.	0.	0.	6460944.9		
86 SEAL INJ	0.	0.	0.	106069.8		
30 SEAL RET	0.	0.	0.	64938.7		
32 LEAKAGE	0.	0.	0.	0.		
24 EXTR	1500.00	294.46	266.73	0.		
35 FW OUT	3013.10	348.50	324.83	6502076.0		
					HEATER	5
13 FW IN	131.80	298.00	267.78	4725859.4	OPEN	
12 EXTR	122.35	613.70	1334.95	291668.6	STO =	-1024.8
111 DRAIN	122.35	342.70	314.09	7355973.9	SC =	0.0
109 ENTRY	0.	0.	280.50	2337734.2		
					HEATER	4
17 FW IN	167.90	265.90	235.03	4725859.8	CLOSED	
15 EXTR	65.46	510.30	1287.74	148029.7	TD =	0.4
16 DRAIN	65.46	271.00	240.02	148029.7	DC =	5.1
					HEATER	3
20 FW IN	167.90	197.70	166.13	4725859.8	CLOSED	
18 EXTR	39.21	409.70	1241.24	296412.4	TD =	0.1
19 DRAIN	39.21	207.00	175.19	444442.1	DC =	9.3
16 ENTRY	65.46	271.00	240.02	148029.7		
					HEATER	2
23 FW IN	167.90	160.90	129.25	4725859.8	CLOSED	
21 EXTR	11.40	228.90	1159.77	153631.6	TD =	1.8
22 DRAIN	11.40	168.70	136.68	598073.7	DC =	7.8
19 ENTRY	39.21	207.00	175.19	444442.1		

TL		PRESS	TEMP	ENTH	FLOW		
						STM SEAL REG	
88	FLOW TO	0.	0.	0.	8020.4	CALCULATED	
70	TDV	5.14	644.60	1357.36	8020.4	TO HEATER	
68	TDV	1.88	480.00	1279.08	0.	TO CONDENSER	
	NOT CODED FOR MU		MEAS TOTAL FLOW =		0.		
						HEATER	1
26	FW IN	228.40	124.20	92.74	4725859.8	CLOSED	
25	EXTR	4.91	0.	1086.23	141255.1	TD =	0.6
123	DRAIN	4.91	130.40	98.36	747349.1	DC =	6.2
22	ENTRY	11.40	168.70	136.68	598073.7		
70	ENTRY	5.14	644.60	1357.36	8020.4		
						PUMP	
33	FW IN	0.	0.	0.	4831929.6		
87	LEAKAGE	0.	0.	0.	0.		
27	FW OUT	0.	0.	0.	4831929.6		
						FW TO BOILER	
1	FW IN	2830.00	554.30	551.63	6502076.0	S+L =	-5157.

T U R B I N E E X P A N S I O N

TL		PRESS	TEMP	ENTH	FLOW		
						MAIN STEAM LINE	
71	EXIT	0.	0.	1450.32	0.		
36	THROTTLE	2477.14	988.20	1450.32	6496919.1		
						VALVE STEM LKG	
						SQRT P/V =	89.971
37	LO NO 1	544.67	872.85	1450.31	2863.5	C =	55.065
						SQRT P/V =	19.687
38	LO NO 2	0.	0.	0.	2090.7	C =	106.199
						EXP TO STG	1
40	SHELL	1992.87	926.23	1426.61	6438693.9		
112	EXTR	0.	0.	1426.61	53270.9		
						PACKING NO	2
						SQRT P/V =	.115E 19
42	LO NO 1	127.70	677.50	1366.82	14646.0	C =	0.000
						SQRT P/V =	4.943
43	LO NO 2	17.18	668.60	1368.34	7530.7	C =	1651.600
						SQRT P/V =	0.663
100	LO NO 3	0.	0.	0.	633.6	C =	1907.083

TL	PRESS	TEMP	ENTH	FLOW	
				EXP TO STG	4
41 SHELL	1124.35	0.	1372.55	5801023.6	
79 EXTR	1110.00	781.40	1372.55	614860.0	
				PACKING NO	1
				SQRT P/V =	24.537
46 LO NO 1	126.30	592.10	1323.82	5338.4	C = 389.192
				SQRT P/V =	5.097
47 LO NO 2	17.02	571.70	1321.46	3577.5	C = 826.231
				SQRT P/V =	0.688
100 LO NO 3	0.	0.	0.	633.6	C = 1907.083
				EXPAND TO EXHAUST	
49 EXH	590.03	612.10	1299.07	5831324.1	
80 EXTR	590.03	612.10	1299.07	585006.7	
50 TO RHT	590.03	612.10	1299.07	5246317.4	
				REHEATER	1
BEFORE LO	0.08	0.	1517.05	0.	
37 ENTRY					
84 AFTER LO	544.47	996.30	1517.01	5249180.9	PCTDP = 7.722
				EXPAND TO BOWL	
51 ENTRY	533.58	995.21	1516.74	5262601.9	
125 ENTRY	545.13	802.90	1412.61	13420.9	
				EXP TO STG	11
52 SHELL	242.73	0.	1412.55	5019763.5	
53 EXTR	240.01	797.50	1422.54	242838.4	
				PACKING NO	3
				SQRT P/V =	4.897
57 LO NO 1	17.00	632.10	1350.61	2280.0	C = 1165.281
				SQRT P/V =	0.667
58 LO NO 2	17.00	641.50	1355.17	2158.7	C = 5133.372
				SQRT P/V =	0.665
100 LO NO 3	0.	0.	0.	633.6	C = 1907.083
				SQRT P/V =	0.
100 LO NO 4	0.	0.	0.	633.6	C = 1907.083

TL	PRESS	TEMP	ENTH	FLOW	
					EXPAND TO EXHAUST
56 EXH	122.65	612.80	1334.47	4463987.5	
55 EXTR	125.75	616.40	1336.09	550070.1	
					EXPAND TO BOWL
59 ENTRY	122.65	612.80	1334.47	4463987.5	
					EXP TO STG 15
61 SHELL	67.63	0.	1275.97	4315957.8	
60 EXTR	66.73	520.50	1292.66	148029.7	
					EXP TO STG 16
63 SHELL	41.18	0.	1231.68	4019545.4	
62 EXTR	40.59	416.80	1244.52	296412.4	
					EXP TO STG 18
65 SHELL	12.09	0.	1140.38	3865913.8	
64 EXTR	11.91	220.70	1155.69	153631.6	
					EXP TO STG 19
107 SHELL	5.14	0.	1086.76	3724658.8	
106 EXTR	5.06	0.	1086.23	141255.1	

TL	PRESS	TEMP	ENTH	FLOW	
					CONDENSER
					SHAFT 1
108 TB EXH	1.57	117.29	1028.1024	3724658.8	LEVL = -4445.2
76 ENTRY	0.	0.	0.	1102826.2	
122 DRAIN	0.	0.	0.	4831930.2	
					GENERATOR 1
					SHAFT 1

MEASURED LOAD = 898356.0 PF = 1.000 H2 = 63.00
SHAFT 1 KW = 910504.5 FL =4353.0 GL = 7795.5

TEST CYCLE HEAT BALANCE

P E R F O R M A N C E

TRUNKLINE OUTPUT

TL	P	T	H	Q	SV	SP	PV	TR
1	2830.0	554.3	551.6	6502076.	0.0213	0.	0.	-5156.9
2	1098.9	779.4	1371.9	614860.	0.6049	556.147	1.847	223.3
3	1098.9	489.3	475.2	614860.	0.0201	0.	7.600	0.
4	2830.0	481.7	466.8	6502076.	0.	0.	0.	0.
5	577.1	610.9	1299.4	585007.	1.0029	482.036	0.336	128.9
6	577.1	406.7	382.7	1199867.	0.0187	0.	9.200	0.
7	2830.0	397.5	375.6	6502076.	0.	0.	0.	0.
8	238.2	796.3	1422.0	242838.	3.0800	396.736	-0.764	399.6
9	238.2	356.5	328.7	1442705.	0.0181	0.	8.000	0.
10	3013.1	348.5	324.8	6502076.	0.0177	0.	0.	0.
11	0.	0.	0.	6460945.	0.	0.	0.	0.
12	122.4	613.7	1334.9	291669.	5.1327	342.726	-1024.800	271.0
13	131.8	298.0	267.8	4725859.	0.0174	0.	0.	0.
14	167.9	298.0	267.8	4725860.	0.0174	1.014	0.	167.9
15	65.5	510.3	1287.7	148030.	8.7032	298.447	0.447	211.9
16	65.5	271.0	240.0	148030.	0.0172	0.	5.100	0.
17	167.9	265.9	235.0	4725860.	0.	0.	0.	0.
18	39.2	409.7	1241.2	296412.	13.0355	266.047	0.147	143.7
19	39.2	207.0	175.2	444442.	0.0167	0.	9.300	0.
20	167.9	197.7	166.1	4725860.	0.	0.	0.	0.
21	11.4	228.9	1159.8	153632.	35.5947	199.469	1.769	29.4
22	11.4	168.7	136.7	598074.	0.0164	0.	7.800	0.
23	167.9	160.9	129.3	4725860.	0.	0.	0.	0.
24	1500.0	294.5	266.7	0.	0.0173	0.	0.	0.
25	4.9	0.	1086.2	141255.	0.	161.469	0.569	-161.5
26	228.4	124.2	92.7	4725860.	0.0162	0.	0.	0.
27	0.	0.	0.	4831930.	0.	0.	0.	0.
28	0.	0.	0.	19289.	0.	0.	0.	0.
29	0.	0.	0.	45650.	0.	0.	0.	0.
30	0.	0.	0.	64939.	0.	0.	0.	0.
31	3027.8	299.1	274.4	0.	0.0172	0.	0.	0.
33	0.	0.	0.	4831930.	0.	0.	0.	0.
34	0.	0.	0.	-5157.	0.	0.	0.	0.
35	3013.1	348.5	324.8	6502076.	0.0177	0.	0.	0.
36	2477.1	988.2	1450.3	6496919.	0.3060	1450.316	89.971	0.
37	544.7	872.9	1450.3	2864.	1.4053	0.780	19.687	55.1
38	0.	0.	0.	2091.	0.	0.	0.	106.2
39	2477.1	0.	1450.3	6491965.	0.3060	0.	89.971	0.
40	1992.9	926.2	1426.6	6438694.	0.3659	143.990	73.796	0.
41	1124.3	0.	1372.5	5801024.	0.5917	559.348	43.590	845.5
42	127.7	677.5	1366.8	14646.	5.2260	0.779	4.943	0.0
43	17.2	668.6	1368.3	7531.	39.0396	0.	0.663	1651.6
45	0.	0.	0.	39850.	0.	0.	0.	0.
46	126.3	592.1	1323.8	5338.	4.8621	0.703	5.097	389.2
47	17.0	571.7	1321.5	3578.	35.9940	0.	0.688	826.2
48	0.	0.	0.	5840874.	0.	0.	0.	0.
49	590.0	612.1	1299.1	5831324.	0.9800	484.404	24.537	0.
50	590.0	612.1	1299.1	5246317.	0.	0.	0.	0.
51	533.6	995.2	1516.7	5262602.	1.5846	0.	18.354	0.

TL	P	T	H	Q	SV	SP	PV	TR
52	242.7	0.	1412.5	5019764.	2.9807	398.783	9.024	782.2
53	240.0	797.5	1422.5	242838.	3.0594	397.396	8.857	0.
54	122.6	612.8	1334.5	5014058.	5.1153	0.	4.897	0.
55	125.8	616.4	1336.1	550070.	5.0048	344.800	0.	0.
56	122.6	612.8	1334.5	4463988.	5.1153	342.911	0.	0.
57	17.0	632.1	1350.6	2280.	38.1675	0.	0.667	1165.3
58	17.0	641.5	1355.2	2159.	38.4989	0.	0.665	5133.4
59	122.6	612.8	1334.5	4463988.	5.1154	0.	4.897	0.
60	66.7	520.5	1292.7	148030.	8.6300	299.726	2.781	0.
61	67.6	0.	1276.0	4315958.	8.2211	300.687	2.868	1063.6
62	40.6	416.8	1244.5	296412.	12.6951	268.135	1.788	0.
63	41.2	0.	1231.7	4019545.	12.1492	269.138	1.841	1080.1
64	11.9	220.7	1155.7	153632.	33.6258	201.590	0.595	0.
65	12.1	0.	1140.4	3865914.	31.9879	202.714	0.615	1044.7
66	16.6	625.7	1347.5	9617.	38.8583	0.	0.	0.
67	109.9	345.6	1195.2	0.	4.1244	0.	0.	0.
68	1.9	480.0	1279.1	0.	297.6007	0.	0.	0.
69	5.1	644.6	1357.4	1863.	127.8890	0.	0.	0.
70	5.1	644.6	1357.4	8020.	127.8890	0.	0.	0.
71	0.	0.	1450.3	0.	0.	0.	0.	0.
72	0.	0.	0.	-1025.	0.	0.	0.	0.
73	0.	0.	0.	-4445.	0.	0.	0.	0.
75	0.	0.	0.	5815.	0.	0.	0.	0.
76	0.	0.	0.	1102826.	0.	0.	0.	0.
79	1110.0	781.4	1372.5	614860.	0.5995	557.401	43.031	0.
80	590.0	612.1	1299.1	585007.	0.	0.	0.	0.
81	12.4	625.7	1347.8	0.	52.0502	0.	0.	0.
82	0.	0.	0.	5246317.	0.	0.	0.	0.
83	122.4	342.7	1190.7	313.	0.	0.	0.	0.
84	544.5	996.3	1517.0	5249181.	1.5528	7.722	18.725	800.5
86	0.	0.	0.	106070.	0.	0.	0.	0.
88	0.	0.	0.	8020.	0.	0.	0.	0.
90	152.3	342.7	314.1	0.	0.0179	0.	0.	0.
91	141.7	234.1	202.7	895029.	0.0169	0.647	0.	141.7
95	1.6	117.3	1020.7	3724659.	198.7881	1028.102	3.195	616.5
99	0.	0.	0.	6971.	0.	0.	0.	0.
100	0.	0.	0.	634.	0.	0.	0.	1907.1
104	2830.0	554.3	551.6	6514032.	0.0213	1.028	0.	2830.0
106	5.1	0.	1086.2	141255.	69.4398	162.741	0.270	0.
107	5.1	0.	1086.8	3724659.	68.3995	0.	0.274	1123.2
108	1.6	117.3	1028.1	3724659.	218.2728	1028.102	3.195	-4445.2
109	0.	0.	280.5	2337734.	0.	0.	0.	0.
111	122.4	342.7	314.1	7355974.	0.0179	0.	0.026	0.
112	0.	0.	1426.6	53271.	0.	0.	0.	0.
113	0.	0.	0.	6415884.	0.	0.	0.115E 19	0.
114	400.4	123.1	92.1	14671.	0.0162	0.624	0.	400.4
115	400.4	123.1	92.1	13570.	0.0162	0.624	0.	400.4
116	400.4	123.1	92.1	27977.	0.0162	0.623	0.	400.4
117	400.4	123.1	92.1	11145.	0.0162	0.660	0.	400.4
118	400.4	123.1	92.1	20090.	0.0162	0.660	0.	400.4
119	400.4	123.1	92.1	18617.	0.0162	0.660	0.	400.4
120	0.	0.	0.	4954.	0.	0.	0.	0.
122	0.	0.	0.	4831930.	0.	0.	0.	0.
123	4.9	130.4	98.4	747349.	0.0162	0.	6.200	0.
125	545.1	802.9	1412.6	13421.	1.3196	0.628	0.	537.8
130	0.	0.	0.	278386.	0.	0.	0.	0.
131	123.2	613.3	1334.7	134133.	5.0959	1.019	0.	123.2
132	123.1	613.1	1334.6	144253.	5.0987	1.020	0.	123.1
133	0.	0.	0.	277752.	0.	0.	0.	0.
201	0.1	0.	1517.0	0.	0.	217.978	0.	0.

TEST CYCLE HEAT BALANCE

VALVE POINT 2ND VL	05/16/87	TEST POINT 09
INTERMOUNTAIN PWR PROJECT		UNIT #2
820000. KW	TC6F-30 IN LSB	TURBINE NO 270T151
2400. PSIG	1000./ 1000. F	2.300 IN HG ABS

CALCULATED USING ASME STEAM TABLES

COMBINED TURBINE-CYCLE PERFORMANCE

	TEST CONDITIONS	* RATED CONDITIONS
TOTAL LOAD	599736.	599283.
HEAT RATE	7756.9	7762.8
THROTTLE FLOW	3978528.	4035857.

TURBINE THERMAL PERFORMANCE

	HIGH PRESS TB		REHEAT TB		
			IP TB		LP TB
	THROTTLE	COLD RHT	INLET	EXH	EXH
PRESS	2393.30	378.40	348.70	79.47	2.063
TEMP	1008.80	565.50	1000.99	622.10	102.18
ENTH	1466.95	1288.98	1525.28	1341.89	1028.46
ENTR	1.5376		1.7795	1.7951	
EFF	81.581		91.669		93.692

ABSCISSA PHPX/PT=0.1581 P1STSTG/PT=0.5065 VAN= 613.5

THRU FLOW PERFORMANCE OF CONDENSING SECTION SHAFT NO 1

	TOTAL TB ENERGY BALANCE		LP TB ENERGY BALANCE	
	RHT TB	LP TB	RHT TB	LP TB
AE	530.27	338.09		
H ELEP	1028.46		1028.46	
H UEEP	1035.99		1035.99	
EFF ELEP	93.69	92.71	93.69	92.71
EFF UEEP	92.27	90.48	92.27	90.48
VAN	613.48		613.48	

* LOAD AND HEAT RATE AT RATED POWER FACTOR AND H2 PRESS. FLOW AT RATED THROTTLE PRESS. OF 2412.2 PSIA AND TEMP. OF 1000 F.

T G L PERFORMANCE OF CONDENSING SECTION   SHAFT NO 1

	TOTAL TB ENERGY BALANCE		LP TB ENERGY BALANCE	
	RHT TB	LP TB	RHT TB	LP TB
H ELEP	1030.38		1030.38	
H UEEP	1037.94		1037.94	
EFF ELEP	93.33	92.14	93.33	92.14
EFF UEEP	91.90	89.90	91.90	89.90
VAN	614.71		614.71	

STAGE FLOW FUNCTION

STG NO	SHELL PRESS	ONE VEL HD	PCT DELTA P	FLANGE PRESS	NOZ AREA	Q/AP H FLG	QFS	Q/AP H SHL
1	1212.30	0.	0.	0.	86.6	0.	3940932.	999.9
4	706.41	1.877	0.84	700.50	157.4	831.6	3610828.	828.1
RH 1	348.70	0.	0.	0.	350.2	0.	3319610.	795.6
8	341.73	0.	0.	0.	350.2	0.	3327842.	813.7
11	155.15	0.484	1.00	153.60	711.2	790.4	3182051.	781.6
15	79.47	0.	0.	0.	807.6	0.	2864751.	1126.7
15	43.95	0.152	1.00	43.51	1414.8	1087.8	2781982.	1066.6
16	26.87	0.109	1.18	26.55	2021.4	1105.1	2607188.	1086.5
18	7.83	0.039	1.45	7.71	6018.0	1096.4	2512066.	1054.9
19	3.32	0.019	1.68	3.26	12096.0	1132.4	2417013.	1122.8

TL	PRESS	TEMP	ENTH	FLOW		

F E E D W A T E R   C Y C L E

TL	PRESS	TEMP	ENTH	FLOW		
					HEATER	8
4 FW IN	2569.50	439.90	420.64	3982651.3	CLOSED	
2 EXTR	695.60	718.80	1357.14	317220.6	TD =	-4.1
3 DRAIN	695.60	444.20	423.90	317220.6	DC =	4.3
					HEATER	7
7 FW IN	2569.50	363.90	340.05	3982651.3	CLOSED	
5 EXTR	370.50	564.60	1289.18	311995.5	TD =	-2.7
6 DRAIN	370.50	369.70	342.87	629216.1	DC =	5.8
3 ENTRY	695.60	444.20	423.90	317220.6		
					HEATER	6
10 FW IN	2698.50	315.30	290.23	3982651.3	CLOSED	
8 EXTR	153.20	801.90	1428.42	145791.1	TD =	-3.8
9 DRAIN	153.20	320.50	291.03	775007.2	DC =	5.2
6 ENTRY	370.50	369.70	342.87	629216.1		
					PUMP	
11 FW IN	0.	0.	0.	3953704.5		
86 SEAL INJ	0.	0.	0.	87343.2		
30 SEAL RET	0.	0.	0.	58396.4		
32 LEAKAGE	0.	0.	0.	0.		
24 EXTR	1500.00	223.68	195.18	0.		
35 FW OUT	2698.50	315.30	290.23	3982651.3		
					HEATER	5
13 FW IN	87.85	271.80	240.88	2999607.5	OPEN	
12 EXTR	78.92	619.20	1340.49	179814.5	STO =	522.8
111 DRAIN	78.92	311.50	281.59	5117596.3	SC =	-0.4
109 ENTRY	0.	0.	246.49	1938899.0		
					HEATER	4
17 FW IN	130.60	242.50	211.20	2999607.7	CLOSED	
15 EXTR	42.80	516.00	1292.55	82769.1	TD =	-0.4
16 DRAIN	42.80	245.50	214.06	82769.1	DC =	3.0
					HEATER	3
20 FW IN	130.60	177.50	145.78	2999607.7	CLOSED	
18 EXTR	25.59	416.30	1246.24	174793.3	TD =	-1.1
19 DRAIN	25.59	184.60	152.65	257562.4	DC =	7.1
16 ENTRY	42.80	245.50	214.06	82769.1		
					HEATER	2
23 FW IN	130.60	143.10	111.36	2999607.7	CLOSED	
21 EXTR	7.34	237.20	1165.02	95122.8	TD =	1.4
22 DRAIN	7.34	165.00	132.97	352685.2	DC =	21.9
19 ENTRY	25.59	184.60	152.65	257562.4		

TL		PRESS	TEMP	ENTH	FLOW		
						STM SEAL REG	
88	FLOW TO	0.	0.	0.	1436.1	CALCULATED	
70	TDV	3.23	462.70	1270.82	1436.1	TO HEATER	
68	TDV	1.26	480.00	1279.14	0.	TO CONDENSER	
	NOT CODED FOR MU		MEAS TOTAL FLOW =		0.		
						HEATER	1
26	FW IN	169.20	110.30	78.72	2999607.7	CLOSED	
25	EXTR	3.16	0.	1093.76	95052.7	TD =	0.5
123	DRAIN	3.16	113.50	81.48	96488.8	DC =	3.2
70	ENTRY	3.23	462.70	1270.82	1436.1		
						PUMP	
33	FW IN	0.	0.	0.	3086951.0		
87	LEAKAGE	0.	0.	0.	0.		
27	FW OUT	0.	0.	0.	3086951.0		
						FW TO BOILER	
1	FW IN	2569.50	506.50	494.97	3982651.3	S+L =	-4124.

T U R B I N E E X P A N S I O N

						MAIN STEAM LINE	
71	EXIT	0.	0.	1466.95	0.		
36	THROTTLE	2393.30	1008.80	1466.95	3978527.8		
						VALVE STEM LKG	
						SQRT P/V =	85.758
37	LO NO 1	348.90	890.69	1466.95	2262.0	C =	55.815
						SQRT P/V =	12.437
38	LO NO 2	0.	0.	0.	2524.6	C =	202.994
						EXP TO STG	1
40	SHELL	1212.30	846.80	1408.33	3940931.7		
112	EXTR	0.	0.	1408.33	32809.6		
						PACKING NO	2
						SQRT P/V =	.115E 19
42	LO NO 1	82.75	648.00	1354.59	9408.3	C =	0.000
						SQRT P/V =	3.238
43	LO NO 2	15.38	638.80	1353.96	2923.8	C =	1072.812
						SQRT P/V =	0.602
100	LO NO 3	0.	0.	0.	550.4	C =	1839.689

TL	PRESS	TEMP	ENTH	FLOW	
					EXP TO STG 4
41 SHELL	706.41	0.	1357.92	3610828.5	
79 EXTR	700.50	720.60	1357.92	317220.6	
					PACKING NO 1
				SQRT P/V =	15.879
46 LO NO 1	81.86	562.40	1312.19	3333.5	C = 381.776
				SQRT P/V =	3.341
47 LO NO 2	15.33	542.60	1307.63	2178.3	C = 816.661
				SQRT P/V =	0.628
100 LO NO 3	0.	0.	0.	550.4	C = 1839.689
					EXPAND TO EXHAUST
49 EXH	378.40	565.50	1288.98	3629343.8	
80 EXTR	378.40	565.50	1288.98	311995.5	
50 TO RHT	378.40	565.50	1288.98	3317348.3	
					REHEATER 1
BEFORE LO	0.08	0.	1525.64	0.	
37 ENTRY					
84 AFTER LO	348.70	1001.60	1525.60	3319610.3	PCTDP = 7.849
					EXPAND TO BOWL
51 ENTRY	341.73	1000.61	1525.28	3327842.3	
125 ENTRY	349.70	754.00	1395.11	8232.0	
					EXP TO STG 11
52 SHELL	155.15	0.	1420.36	3182051.3	
53 EXTR	153.60	804.20	1429.57	145791.1	
					PACKING NO 3
				SQRT P/V =	3.148
57 LO NO 1	15.33	630.20	1349.79	1261.2	C = 1192.521
				SQRT P/V =	0.602
58 LO NO 2	15.33	644.40	1356.68	1392.4	C = 4139.534
				SQRT P/V =	0.598
100 LO NO 3	0.	0.	0.	550.4	C = 1839.689
				SQRT P/V =	0.
100 LO NO 4	0.	0.	0.	550.4	C = 1839.689

TL	PRESS	TEMP	ENTH	FLOW	
					EXPAND TO EXHAUST
56 EXH	79.47	622.10	1341.89	2864750.7	
55 EXTR	81.53	624.50	1342.95	313546.2	
					EXPAND TO BOWL
59 ENTRY	79.47	622.10	1341.89	2864750.7	
					EXP TO STG 15
61 SHELL	43.95	0.	1284.38	2781981.6	
60 EXTR	43.51	531.20	1299.87	82769.1	
					EXP TO STG 16
63 SHELL	26.87	0.	1239.88	2607188.3	
62 EXTR	26.55	426.60	1251.06	174793.3	
					EXP TO STG 18
65 SHELL	7.83	0.	1146.72	2512065.5	
64 EXTR	7.71	244.20	1168.17	95122.8	
					EXP TO STG 19
107 SHELL	3.32	0.	1093.63	2417012.8	
106 EXTR	3.26	0.	1093.76	95052.7	
					CONDENSER
					SHAFT 1
108 TB EXH	1.01	102.18	1035.9861	2417012.8	LEVL = -4848.2
76 ENTRY	0.	0.	0.	312405.1	
22 ENTRY	7.34	165.00	132.97	352685.2	
122 DRAIN	0.	0.	0.	3086951.3	
					GENERATOR 1
					SHAFT 1

MEASURED LOAD = 599736.0 PF = 0.996 H2 = 63.00
SHAFT 1 KW = 609427.8 FL =4353.0 GL = 5338.8

TEST CYCLE HEAT BALANCE

P E R F O R M A N C E

TRUNKLINE OUTPUT

TL	P	T	H	Q	SV	SP	PV	TR
1	2569.5	506.5	495.0	3982651.	0.0202	0.	0.	-4123.5
2	695.6	718.8	1357.1	317221.	0.9335	502.379	-4.121	216.4
3	695.6	444.2	423.9	317221.	0.0193	0.	4.300	0.
4	2569.5	439.9	420.6	3982651.	0.	0.	0.	0.
5	370.5	564.6	1289.2	311995.	1.5336	437.166	-2.734	127.4
6	370.5	369.7	342.9	629216.	0.0182	0.	5.800	0.
7	2569.5	363.9	340.1	3982651.	0.	0.	0.	0.
8	153.2	801.9	1428.4	145791.	4.8453	360.098	-3.802	441.8
9	153.2	320.5	291.0	775007.	0.0177	0.	5.200	0.
10	2698.5	315.3	290.2	3982651.	0.0174	0.	0.	0.
11	0.	0.	0.	3953704.	0.	0.	0.	0.
12	78.9	619.2	1340.5	179814.	8.0518	311.102	522.800	308.1
13	87.9	271.8	240.9	2999608.	0.0172	0.	0.	0.
14	130.6	271.8	241.0	2999608.	0.0172	1.014	0.	130.6
15	42.8	516.0	1292.5	82769.	13.4585	271.362	-0.438	244.6
16	42.8	245.5	214.1	82769.	0.0170	0.	3.000	0.
17	130.6	242.5	211.2	2999608.	0.	0.	0.	0.
18	25.6	416.3	1246.2	174793.	20.2241	241.366	-1.134	174.9
19	25.6	184.6	152.7	257562.	0.0165	0.	7.100	0.
20	130.6	177.5	145.8	2999608.	0.	0.	0.	0.
21	7.3	237.2	1165.0	95123.	56.2127	178.945	1.445	58.3
22	7.3	165.0	133.0	352685.	0.0164	0.	21.900	0.
23	130.6	143.1	111.4	2999608.	0.	0.	0.	0.
24	1500.0	223.7	195.2	0.	0.0167	0.	0.	0.
25	3.2	0.	1093.8	95053.	0.	143.570	0.470	-143.6
26	169.2	110.3	78.7	2999608.	0.0162	0.	0.	0.
27	0.	0.	0.	3086951.	0.	0.	0.	0.
28	0.	0.	0.	17687.	0.	0.	0.	0.
29	0.	0.	0.	40709.	0.	0.	0.	0.
30	0.	0.	0.	58396.	0.	0.	0.	0.
31	2697.9	302.6	277.3	0.	0.0173	0.	0.	0.
33	0.	0.	0.	3086951.	0.	0.	0.	0.
34	0.	0.	0.	-4124.	0.	0.	0.	0.
35	2698.5	315.3	290.2	3982651.	0.0174	0.	0.	0.
36	2393.3	1008.8	1466.9	3978528.	0.3254	1466.949	85.758	0.
37	348.9	890.7	1467.0	2262.	2.2557	0.780	12.437	55.8
38	0.	0.	0.	2525.	0.	0.	0.	203.0
39	2393.3	0.	1466.9	3973741.	0.3254	0.	85.758	0.
40	1212.3	846.8	1408.3	3940932.	0.5852	134.812	45.514	0.
41	706.4	0.	1357.9	3610828.	0.9205	504.908	27.703	828.1
42	82.7	648.0	1354.6	9408.	7.8901	0.779	3.238	0.0
43	15.4	638.8	1354.0	2924.	42.4579	0.	0.602	1072.8
45	0.	0.	0.	24578.	0.	0.	0.	0.
46	81.9	562.4	1312.2	3333.	7.3319	0.704	3.341	381.8
47	15.3	542.6	1307.6	2178.	38.8341	0.	0.628	816.7
48	0.	0.	0.	3635406.	0.	0.	0.	0.
49	378.4	565.5	1289.0	3629344.	1.5007	439.200	15.879	0.
50	378.4	565.5	1289.0	3317348.	0.	0.	0.	0.
51	341.7	1000.6	1525.3	3327842.	2.5069	0.	11.678	0.

TL	P	T	H	Q	SV	SP	PV	TR
52	155.1	0.	1420.4	3182051.	4.7345	361.563	5.725	781.6
53	153.6	804.2	1429.6	145791.	4.8417	360.305	5.632	0.
54	79.5	622.1	1341.9	3178297.	8.0179	0.	3.148	0.
55	81.5	624.5	1343.0	313546.	7.8311	313.353	0.	0.
56	79.5	622.1	1341.9	2864751.	8.0179	311.581	0.	0.
57	15.3	630.2	1349.8	1261.	42.2607	0.	0.602	1192.5
58	15.3	644.4	1356.7	1392.	42.8154	0.	0.598	4139.5
59	79.5	622.1	1341.9	2864751.	8.0179	0.	3.148	0.
60	43.5	531.2	1299.9	82769.	13.4503	272.370	1.799	0.
61	43.9	0.	1284.4	2781982.	12.9301	273.346	1.844	1066.6
62	26.5	426.6	1251.1	174793.	19.7239	243.420	1.160	0.
63	26.9	0.	1239.9	2607188.	19.0663	244.527	1.187	1086.5
64	7.7	244.2	1168.2	95123.	54.0014	181.205	0.378	0.
65	7.8	0.	1146.7	2512066.	49.9895	182.295	0.396	1054.9
66	15.1	613.2	1341.6	8844.	42.1195	0.	0.	0.
67	78.9	314.0	1184.4	0.	5.5677	0.	0.	0.
68	1.3	480.0	1279.1	0.	443.4005	0.	0.	0.
69	3.2	462.7	1270.8	0.	169.7525	0.	0.	0.
70	3.2	462.7	1270.8	1436.	169.7525	0.	0.	0.
71	0.	0.	1466.9	0.	0.	0.	0.	0.
72	0.	0.	0.	523.	0.	0.	0.	0.
73	0.	0.	0.	-4848.	0.	0.	0.	0.
75	0.	0.	0.	5542.	0.	0.	0.	0.
76	0.	0.	0.	312405.	0.	0.	0.	0.
79	700.5	720.6	1357.9	317221.	0.9283	503.161	27.470	0.
80	378.4	565.5	1289.0	311995.	0.	0.	0.	0.
81	15.1	613.2	1341.6	0.	42.0916	0.	0.	0.
82	0.	0.	0.	3317348.	0.	0.	0.	0.
83	78.9	311.1	1182.8	202.	0.	0.	0.	0.
84	348.7	1001.6	1525.6	3319610.	2.4566	7.849	11.914	795.6
86	0.	0.	0.	87343.	0.	0.	0.	0.
88	0.	0.	0.	1436.	0.	0.	0.	0.
90	108.9	311.5	281.6	0.	0.0176	0.	0.	0.
91	114.1	248.1	216.8	1163892.	0.0170	0.647	0.	114.1
95	1.0	102.2	1028.5	2417013.	304.8236	1035.986	2.063	613.5
99	0.	0.	0.	6055.	0.	0.	0.	0.
100	0.	0.	0.	550.	0.	0.	0.	1839.7
104	2569.5	506.5	495.0	3985723.	0.0202	1.028	0.	2569.5
106	3.3	0.	1093.8	95053.	106.4798	144.763	0.175	0.
107	3.3	0.	1093.6	2417013.	104.7646	0.	0.178	1122.8
108	1.0	102.2	1036.0	2417013.	329.4876	1035.986	2.063	-4848.2
109	0.	0.	246.5	1938899.	0.	0.	0.	0.
111	78.9	311.5	281.6	5117596.	5.5453	0.	-0.398	0.
112	0.	0.	1408.3	32810.	0.	0.	0.	0.
113	0.	0.	0.	3928049.	0.	0.	0.115E 19	0.
114	477.5	108.5	77.7	14266.	0.0161	0.624	0.	477.5
115	477.5	108.5	77.7	15022.	0.0161	0.624	0.	477.5
116	477.5	108.5	77.7	25866.	0.0161	0.623	0.	477.5
117	477.5	108.5	77.7	14945.	0.0161	0.660	0.	477.5
118	477.5	108.5	77.7	0.	0.0161	0.	0.	0.
119	477.5	108.5	77.7	17244.	0.0161	0.660	0.	477.5
120	0.	0.	0.	4787.	0.	0.	0.	0.
122	0.	0.	0.	3086951.	0.	0.	0.	0.
123	3.2	113.5	81.5	96489.	0.0162	0.	3.200	0.
125	349.7	754.0	1395.1	8232.	2.0007	0.628	0.	345.5
130	0.	0.	0.	146474.	0.	0.	0.	0.
131	79.9	619.2	1340.4	70599.	7.9520	1.018	0.	79.9
132	80.1	618.9	1340.3	75875.	7.9276	1.019	0.	80.1
133	0.	0.	0.	145923.	0.	0.	0.	0.
201	0.1	0.	1525.6	0.	0.	236.662	0.	0.

TEST CYCLE HEAT BALANCE

VALVE POINT 3RD VL	05/16/87	TEST POINT 10
INTERMOUNTAIN PWR PROJECT		UNIT #2
820000. KW	TC6F-30 IN LSB	TURBINE NO 270T151
2400. PSIG	1000./ 1000. F	2.300 IN HG ABS

CALCULATED USING ASME STEAM TABLES

COMBINED TURBINE-CYCLE PERFORMANCE

	TEST CONDITIONS	* RATED CONDITIONS
TOTAL LOAD	789272.	788480.
HEAT RATE	7784.0	7791.8
THROTTLE FLOW	5527099.	5612929.

TURBINE THERMAL PERFORMANCE

	HIGH PRESS TB		REHEAT TB		
			IP TB		LP TB
	THROTTLE	COLD RHT	INLET	EXH	EXH
PRESS	2382.40	512.70	473.00	107.50	2.956
TEMP	1001.70	606.50	1007.01	624.60	114.54
ENTH	1462.61	1302.07	1524.88	1341.37	1030.66
ENTR	1.5351		1.7462	1.7618	
EFF	86.188		91.698		93.468

ABSCISSA PHPX/PT=0.2152 P1STSTG/PT=0.7131 VAN= 588.8

THRU FLOW PERFORMANCE OF CONDENSING SECTION SHAFT NO 1

	TOTAL TB ENERGY BALANCE		LP TB ENERGY BALANCE	
	RHT TB	LP TB	RHT TB	LP TB
AE	528.77	336.32		
H ELEP	1030.66		1030.66	
H UEEP	1038.10		1038.10	
EFF ELEP	93.47	92.39	93.47	92.39
EFF UEEP	92.06	90.17	92.06	90.17
VAN	588.80		588.80	

* LOAD AND HEAT RATE AT RATED POWER FACTOR AND H2 PRESS. FLOW AT RATED THROTTLE PRESS. OF 2412.2 PSIA AND TEMP. OF 1000 F.

T G L PERFORMANCE OF CONDENSING SECTION SHAFT NO 1

	TOTAL TB ENERGY BALANCE		LP TB ENERGY BALANCE	
	RHT TB	LP TB	RHT TB	LP TB
H ELEP	1032.68		1032.68	
H UEEP	1040.16		1040.16	
EFF ELEP	93.08	91.78	93.08	91.78
EFF UEEP	91.67	89.56	91.67	89.56
VAN	590.06		590.06	

STAGE FLOW FUNCTION

STG NO	SHELL PRESS	ONE VEL HD	PCT DELTA P	FLANGE PRESS	NOZ AREA	Q/AP H FLG	QFS	Q/AP H SHL
1	1698.80	0.	0.	0.	86.6	0.	5477243.	1007.5
4	973.63	3.438	1.11	962.80	157.4	843.3	4964326.	838.5
RH 1	473.00	0.	0.	0.	350.2	0.	4522392.	798.5
8	463.54	0.	0.	0.	350.2	0.	4533585.	816.7
11	210.70	0.720	1.09	208.40	711.2	791.2	4326377.	782.0
15	107.50	0.	0.	0.	807.6	0.	3884894.	1128.6
15	59.35	0.245	1.20	58.64	1414.8	1089.7	3762662.	1066.9
16	36.17	0.164	1.31	35.70	2021.4	1106.4	3514296.	1086.2
18	10.57	0.052	1.42	10.42	6018.0	1091.1	3386760.	1052.5
19	4.50	0.023	1.46	4.44	12096.0	1133.7	3267123.	1125.3

TL	PRESS	TEMP	ENTH	FLOW		

F E E D W A T E R   C Y C L E

TL	PRESS	TEMP	ENTH	FLOW		
					HEATER	8
4 FW IN	2658.10	468.90	452.50	5487507.4	CLOSED	
2 EXTR	953.50	771.80	1374.82	495782.4	TD =	-1.9
3 DRAIN	953.50	475.10	458.86	495782.4	DC =	6.2
					HEATER	7
7 FW IN	2658.10	387.10	364.43	5487507.4	CLOSED	
5 EXTR	501.00	605.40	1302.37	470775.2	TD =	-1.7
6 DRAIN	501.00	394.70	369.68	966557.6	DC =	7.6
3 ENTRY	953.50	475.10	458.86	495782.4		
					HEATER	6
10 FW IN	2742.60	337.40	312.94	5487507.4	CLOSED	
8 EXTR	207.00	806.50	1428.55	207207.6	TD =	-2.4
9 DRAIN	207.00	344.30	315.90	1173765.2	DC =	6.9
6 ENTRY	501.00	394.70	369.68	966557.6		
					PUMP	
11 FW IN	0.	0.	0.	5486207.6		
86 SEAL INJ	0.	0.	0.	108611.9		
30 SEAL RET	0.	0.	0.	63704.0		
32 LEAKAGE	0.	0.	0.	0.		
24 EXTR	1500.00	200.00	171.47	0.		
35 FW OUT	2742.60	337.40	312.94	5531115.4		
					HEATER	5
13 FW IN	116.30	290.10	259.64	4063570.8	OPEN	
12 EXTR	107.10	624.30	1341.25	248885.5	STD =	-257.2
111 DRAIN	107.10	333.10	304.04	6437598.4	SC =	-0.3
109 ENTRY	0.	0.	267.62	2125156.0		
					HEATER	4
17 FW IN	161.80	258.80	227.79	4063571.6	CLOSED	
15 EXTR	57.56	520.40	1293.41	122231.4	TD =	-0.1
16 DRAIN	57.56	263.00	231.85	122231.4	DC =	4.2
					HEATER	3
20 FW IN	161.80	191.60	159.99	4063571.6	CLOSED	
18 EXTR	34.53	419.30	1246.53	248366.5	TD =	-0.3
19 DRAIN	34.53	200.30	168.44	370597.9	DC =	8.7
16 ENTRY	57.56	263.00	231.85	122231.4		
					HEATER	2
23 FW IN	161.80	155.80	124.14	4063571.6	CLOSED	
21 EXTR	10.00	237.30	1164.21	127535.5	TD =	1.6
22 DRAIN	10.00	162.90	130.87	498133.5	DC =	7.1
19 ENTRY	34.53	200.30	168.44	370597.9		

TL		PRESS	TEMP	ENTH	FLOW		
						STM SEAL REG	
88	FLOW TO	0.	0.	0.	3136.5	CALCULATED	
70	TDV	4.47	655.80	1362.82	3136.5	TO HEATER	
68	TDV	1.73	480.00	1279.10	0.	TO CONDENSER	
	NOT CODED FOR MU		MEAS TOTAL FLOW =		0.		
						HEATER	1
26	FW IN	206.50	120.80	89.29	4063571.6	CLOSED	
25	EXTR	4.32	0.	1093.23	119637.6	TD =	0.4
123	DRAIN	4.32	126.50	94.46	620907.5	DC =	5.7
22	ENTRY	10.00	162.90	130.87	498133.5		
70	ENTRY	4.47	655.80	1362.82	3136.5		
						PUMP	
33	FW IN	0.	0.	0.	4172183.4		
87	LEAKAGE	0.	0.	0.	0.		
27	FW OUT	0.	0.	0.	4172183.4		
						FW TO BOILER	
1	FW IN	2658.10	540.70	535.26	5487507.4	S+L =	-4016.

T U R B I N E E X P A N S I O N

TL		PRESS	TEMP	ENTH	FLOW		
						MAIN STEAM LINE	
71	EXIT	0.	0.	1462.61	0.		
36	THROTTLE	2382.40	1001.70	1462.61	5527099.1		
						VALVE STEM LKG	
						SQRT P/V =	85.663
37	LO NO 1	473.20	890.85	1462.61	2643.9	C =	55.622
						SQRT P/V =	16.934
38	LO NO 2	0.	0.	0.	2120.9	C =	125.247
						EXP TO STG	1
40	SHELL	1698.80	911.18	1428.41	5477243.4		
112	EXTR	0.	0.	1428.41	45090.9		
						PACKING NO	2
						SQRT P/V =	.115E 19
42	LO NO 1	112.00	682.00	1369.92	12743.4	C =	0.000
						SQRT P/V =	4.322
43	LO NO 2	16.82	675.50	1371.73	3749.2	C =	1016.109
						SQRT P/V =	0.647
100	LO NO 3	0.	0.	0.	642.7	C =	1973.597

TL	PRESS	TEMP	ENTH	FLOW		
					EXP TO STG	4
41 SHELL	973.63	0.	1375.56	4964325.7		
79 EXTR	962.80	773.80	1375.56	495782.4		
					PACKING NO	1
					SQRT P/V =	21.239
46 LO NO 1	110.65	593.20	1325.46	3985.7	C =	362.561
					SQRT P/V =	4.457
47 LO NO 2	16.74	574.10	1322.64	3072.0	C =	833.450
					SQRT P/V =	0.676
100 LO NO 3	0.	0.	0.	642.7	C =	1973.597
					EXPAND TO EXHAUST	
49 EXH	512.70	606.50	1302.07	4990523.2		
80 EXTR	512.70	606.50	1302.07	470775.2		
50 TO RHT	512.70	606.50	1302.07	4519748.0		
					REHEATER	1
BEFORE LO	0.08	0.	1525.18	0.		
37 ENTRY						
84 AFTER LO	473.00	1007.50	1525.15	4522391.9	PCTDP =	7.743
					EXPAND TO BOWL	
51 ENTRY	463.54	1006.50	1524.88	4533584.9		
125 ENTRY	473.85	807.40	1418.07	11193.0		
					EXP TO STG	11
52 SHELL	210.70	0.	1420.51	4326377.3		
53 EXTR	208.40	808.20	1429.36	207207.6		
					PACKING NO	3
					SQRT P/V =	4.262
57 LO NO 1	16.74	638.60	1353.78	1732.9	C =	1153.252
					SQRT P/V =	0.655
58 LO NO 2	16.73	650.30	1359.46	1897.0	C =	4857.146
					SQRT P/V =	0.651
100 LO NO 3	0.	0.	0.	642.7	C =	1973.597
					SQRT P/V =	0.
100 LO NO 4	0.	0.	0.	642.7	C =	1973.597

TL	PRESS	TEMP	ENTH	FLOW	
					EXPAND TO EXHAUST
56 EXH	107.50	624.60	1341.37	3884893.9	
55 EXTR	110.30	627.70	1342.75	436568.0	
					EXPAND TO BOWL
59 ENTRY	107.50	624.60	1341.37	3884893.9	
					EXP TO STG 15
61 SHELL	59.35	0.	1284.30	3762662.5	
60 EXTR	58.64	532.50	1299.25	122231.4	
					EXP TO STG 16
63 SHELL	36.17	0.	1239.64	3514296.0	
62 EXTR	35.70	427.90	1250.55	248366.5	
					EXP TO STG 18
65 SHELL	10.57	0.	1146.86	3386760.5	
64 EXTR	10.42	241.60	1166.11	127535.5	
					EXP TO STG 19
107 SHELL	4.50	0.	1093.62	3267122.9	
106 EXTR	4.44	0.	1093.23	119637.6	

TL	PRESS	TEMP	ENTH	FLOW	
					CONDENSER SHAFT 1
108 TB EXH	1.45	114.54	1038.0987	3267122.9	LEVL = -4030.2
76 ENTRY	0.	0.	0.	901030.3	
122 DRAIN	0.	0.	0.	4172183.4	
					GENERATOR 1 SHAFT 1

MEASURED LOAD = 789272.0 PF = 0.998 H2 = 63.00
SHAFT 1 KW = 800405.9 FL =4353.0 GL = 6780.9

TEST CYCLE HEAT BALANCE

P E R F O R M A N C E

TRUNKLINE OUTPUT

TL	P	T	H	Q	SV	SP	PV	TR
1	2658.1	540.7	535.3	5487507.	0.0210	0.	0.	-4016.3
2	953.5	771.8	1374.8	495782.	0.7020	538.835	-1.865	233.0
3	953.5	475.1	458.9	495782.	0.0198	0.	6.200	0.
4	2658.1	468.9	452.5	5487507.	0.	0.	0.	0.
5	501.0	605.4	1302.4	470775.	1.1641	467.215	-1.685	138.2
6	501.0	394.7	369.7	966558.	0.0185	0.	7.600	0.
7	2658.1	387.1	364.4	5487507.	0.	0.	0.	0.
8	207.0	806.5	1428.5	207208.	3.5841	384.698	-2.402	421.8
9	207.0	344.3	315.9	1173765.	0.0179	0.	6.900	0.
10	2742.6	337.4	312.9	5487507.	0.0176	0.	0.	0.
11	0.	0.	0.	5486208.	0.	0.	0.	0.
12	107.1	624.3	1341.2	248885.	5.9385	332.821	-257.200	291.5
13	116.3	290.1	259.6	4063571.	0.0174	0.	0.	0.
14	161.8	290.1	259.7	4063572.	0.0174	1.014	0.	161.8
15	57.6	520.4	1293.4	122231.	10.0231	290.011	-0.089	230.4
16	57.6	263.0	231.9	122231.	0.0171	0.	4.200	0.
17	161.8	258.8	227.8	4063572.	0.	0.	0.	0.
18	34.5	419.3	1246.5	248367.	14.9977	258.490	-0.310	160.8
19	34.5	200.3	168.4	370598.	0.0166	0.	8.700	0.
20	161.8	191.6	160.0	4063572.	0.	0.	0.	0.
21	10.0	237.3	1164.2	127536.	41.1588	193.200	1.600	44.1
22	10.0	162.9	130.9	498133.	0.0164	0.	7.100	0.
23	161.8	155.8	124.1	4063572.	0.	0.	0.	0.
24	1500.0	200.0	171.5	0.	0.0166	0.	0.	0.
25	4.3	0.	1093.2	119638.	0.	156.155	0.355	-156.2
26	206.5	120.8	89.3	4063572.	0.0162	0.	0.	0.
27	0.	0.	0.	4172183.	0.	0.	0.	0.
28	0.	0.	0.	19516.	0.	0.	0.	0.
29	0.	0.	0.	44188.	0.	0.	0.	0.
30	0.	0.	0.	63704.	0.	0.	0.	0.
31	2749.1	336.5	312.0	43608.	0.0176	1.001	0.	2749.1
33	0.	0.	0.	4172183.	0.	0.	0.	0.
34	0.	0.	0.	-4016.	0.	0.	0.	0.
35	2742.6	337.4	312.9	5531115.	0.0176	0.	0.	0.
36	2382.4	1001.7	1462.6	5527099.	0.3247	0.133E 37	85.663	0.
37	473.2	890.9	1462.6	2644.	1.6502	0.780	16.934	55.6
38	0.	0.	0.	2121.	0.	0.	0.	125.2
39	2382.4	0.	1462.6	5522334.	0.3247	0.	85.663	0.
40	1698.8	911.2	1428.4	5477243.	0.4311	142.656	62.774	0.
41	973.6	0.	1375.6	4964326.	0.6882	541.884	37.612	838.5
42	112.0	682.0	1369.9	12743.	5.9948	0.779	4.322	0.0
43	16.8	675.5	1371.7	3749.	40.1225	0.	0.647	1016.1
45	0.	0.	0.	33898.	0.	0.	0.	0.
46	110.7	593.2	1325.5	3986.	5.5700	0.703	4.457	362.6
47	16.7	574.1	1322.6	3072.	36.6838	0.	0.676	833.5
48	0.	0.	0.	4998224.	0.	0.	0.	0.
49	512.7	606.5	1302.1	4990523.	1.1366	469.601	21.239	0.
50	512.7	606.5	1302.1	4519748.	0.	0.	0.	0.
51	463.5	1006.5	1524.9	4533585.	1.8455	0.	15.851	0.

TL	P	T	H	Q	SV	SP	PV	TR
52	210.7	0.	1420.5	4326377.	3.4816	386.612	7.779	782.0
53	208.4	808.2	1429.4	207208.	3.5647	385.268	7.646	0.
54	107.5	624.6	1341.4	4321462.	5.9178	0.	4.262	0.
55	110.3	627.7	1342.7	436568.	5.7827	334.988	0.	0.
56	107.5	624.6	1341.4	3884894.	5.9178	333.095	0.	0.
57	16.7	638.6	1353.8	1733.	38.9943	0.	0.655	1153.3
58	16.7	650.3	1359.5	1897.	39.4367	0.	0.651	4857.1
59	107.5	624.6	1341.4	3884894.	5.9178	0.	4.262	0.
60	58.6	532.5	1299.3	122231.	9.9634	291.217	2.426	0.
61	59.4	0.	1284.3	3762662.	9.5508	292.154	2.493	1066.9
62	35.7	427.9	1250.6	248367.	14.6492	260.454	1.561	0.
63	36.2	0.	1239.6	3514296.	14.1191	261.500	1.601	1086.2
64	10.4	241.6	1166.1	127536.	39.7310	195.160	0.512	0.
65	10.6	0.	1146.9	3386760.	36.9731	196.276	0.535	1052.5
66	16.4	629.1	1349.2	9435.	39.4093	0.	0.	0.
67	107.1	335.6	1190.0	0.	4.1713	0.	0.	0.
68	1.7	480.0	1279.1	0.	323.7902	0.	0.	0.
69	4.5	655.8	1362.8	919.	148.6988	0.	0.	0.
70	4.5	655.8	1362.8	3137.	148.6988	0.	0.	0.
71	0.	0.	1462.6	0.	0.	0.	0.	0.
72	0.	0.	0.	-257.	0.	0.	0.	0.
73	0.	0.	0.	-4030.	0.	0.	0.	0.
75	0.	0.	0.	5579.	0.	0.	0.	0.
76	0.	0.	0.	901030.	0.	0.	0.	0.
79	962.8	773.8	1375.6	495782.	0.6961	540.001	37.192	0.
80	512.7	606.5	1302.1	470775.	0.	0.	0.	0.
81	16.4	629.1	1349.2	0.	39.4093	0.	0.	0.
82	0.	0.	0.	4519748.	0.	0.	0.	0.
83	107.1	332.8	1188.4	271.	0.	0.	0.	0.
84	473.0	1007.5	1525.1	4522392.	1.8085	7.743	16.172	798.5
86	0.	0.	0.	108612.	0.	0.	0.	0.
88	0.	0.	0.	3137.	0.	0.	0.	0.
90	137.1	333.1	304.1	0.	0.0178	0.	0.	0.
91	131.6	239.4	208.1	951391.	0.0169	0.647	0.	131.6
95	1.5	114.5	1030.7	3267123.	216.4359	1038.099	2.956	588.8
99	0.	0.	0.	7071.	0.	0.	0.	0.
100	0.	0.	0.	643.	0.	0.	0.	1973.6
104	2658.1	540.7	535.3	5393140.	0.0210	1.028	0.	2658.1
106	4.4	0.	1093.2	119638.	79.2923	157.242	0.237	0.
107	4.5	0.	1093.6	3267123.	78.1822	0.	0.240	1125.3
108	1.5	114.5	1038.1	3267123.	234.8375	1038.099	2.956	-4030.2
109	0.	0.	267.6	2125156.	0.	0.	0.	0.
111	107.1	333.1	304.0	6437598.	4.1542	0.	-0.279	0.
112	0.	0.	1428.4	45091.	0.	0.	0.	0.
113	0.	0.	0.	5460108.	0.	0.	0.115E 19	0.
114	436.9	119.7	88.8	14740.	0.0162	0.624	0.	436.9
115	436.9	119.7	88.8	13690.	0.0162	0.624	0.	436.9
116	436.9	119.7	88.8	27343.	0.0162	0.623	0.	436.9
117	436.9	119.7	88.8	13384.	0.0162	0.660	0.	436.9
118	436.9	119.7	88.8	19274.	0.0162	0.660	0.	436.9
119	436.9	119.7	88.8	20182.	0.0162	0.660	0.	436.9
120	0.	0.	0.	4765.	0.	0.	0.	0.
122	0.	0.	0.	4172183.	0.	0.	0.	0.
123	4.3	126.5	94.5	620908.	0.0162	0.	5.700	0.
125	473.9	807.4	1418.1	11193.	1.5335	0.628	0.	467.9
130	0.	0.	0.	204412.	0.	0.	0.	0.
131	108.3	624.0	1341.0	99289.	5.8700	1.018	0.	108.3
132	108.4	623.8	1340.9	105122.	5.8633	1.019	0.	108.4
133	0.	0.	0.	203769.	0.	0.	0.	0.
201	0.1	0.	1525.2	0.	0.	223.110	0.	0.

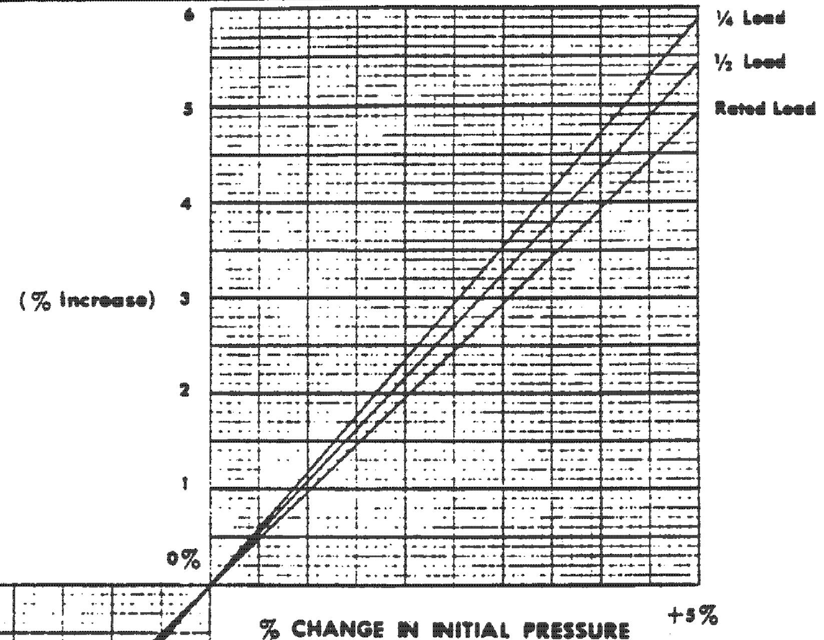
APPENDIX B

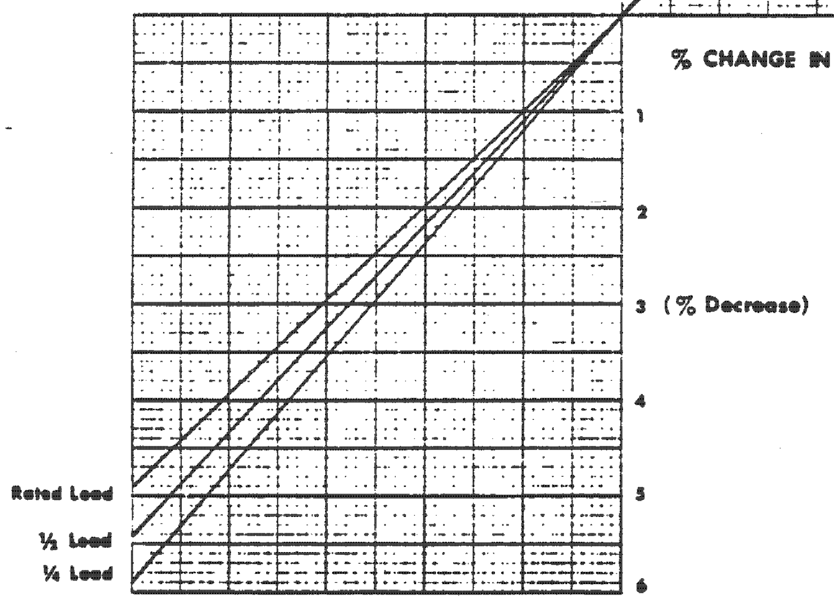
Correction Curves

INITIAL PRESSURE CORRECTION FACTORS

FOR SINGLE REHEAT UNITS

% CHANGE IN KILOWATT LOAD





METHOD OF USING CURVES

These correction factors assume constant control valve opening and are to be applied to heat rates and kilowatt loads at rated steam conditions.

1. The heat rate at the desired condition can be found by multiplying the heat rate at rated conditions by the following:

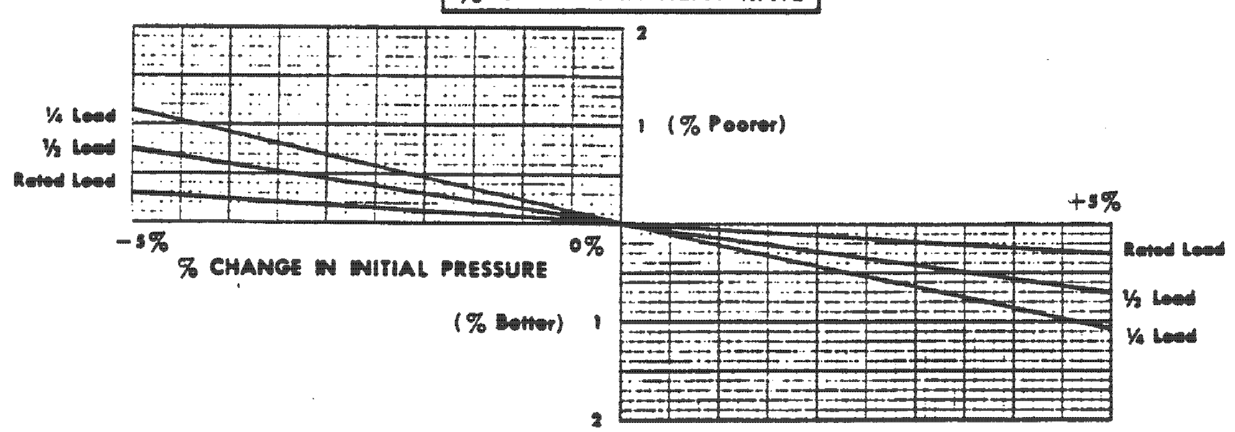
$$1 + \frac{\text{\% change in gross heat rate}}{100}$$

2. The kilowatt load at the desired conditions can be found by multiplying the kilowatt load at rated conditions by the following:

$$1 + \frac{\text{\% change in kw load}}{100}$$

3. These correction factors are not guaranteed.

% CHANGE IN HEAT RATE



GEZ-3614

4-81 (2M)

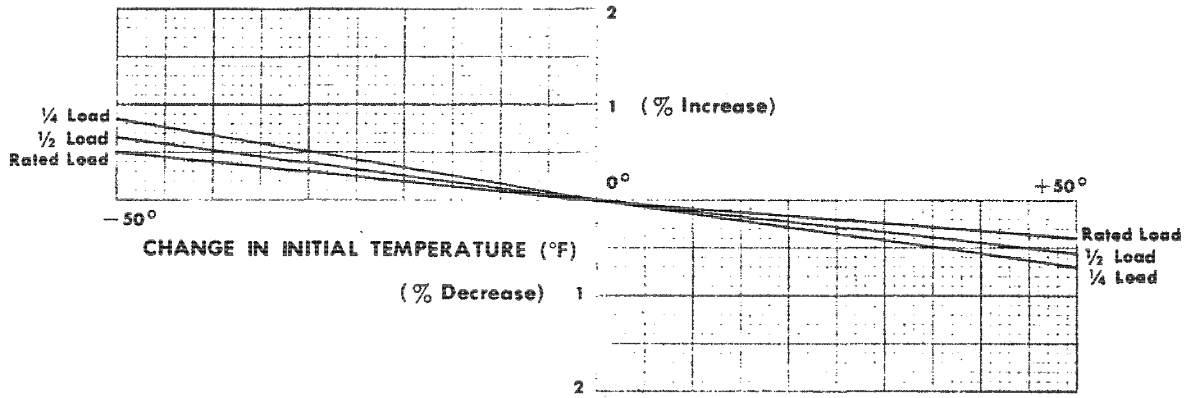
GENERAL ELECTRIC

FIG. B1

IP14_005181

INITIAL TEMPERATURE CORRECTION FACTORS
FOR SINGLE REHEAT – SUBCRITICAL PRESSURE UNITS

% CHANGE IN KILOWATT LOAD



METHOD OF USING CURVES

These correction factors assume constant control valve opening and are to be applied to heat rates and kilowatt loads at rated steam conditions.

1. The heat rate at the desired condition can be found by multiplying the heat rate at rated conditions by the following:

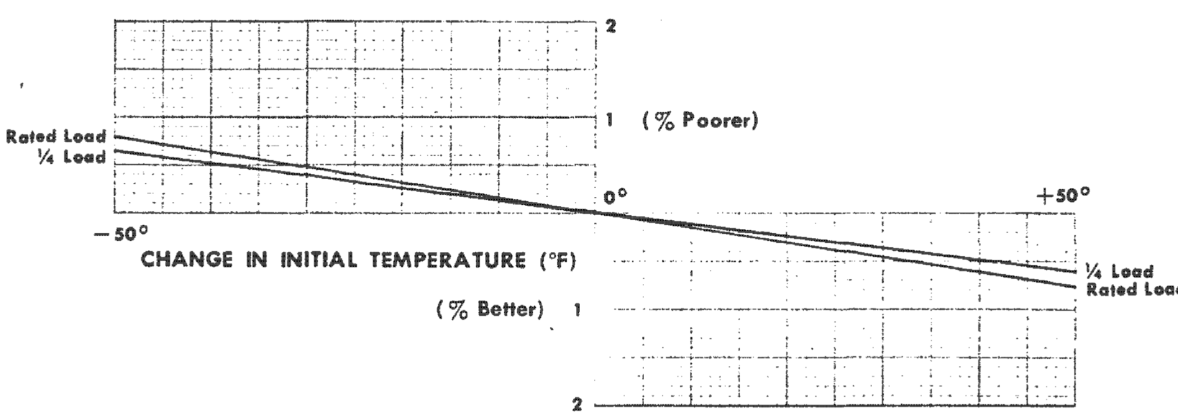
$$1 + \frac{\%\ \text{change in gross heat rate}}{100}$$

2. The kilowatt load at the desired conditions can be found by multiplying the kilowatt load at rated conditions by the following:

$$1 + \frac{\%\ \text{change in kw load}}{100}$$

3. These correction factors are not guaranteed.

% CHANGE IN HEAT RATE



GEZ-3615
6-67 (2M)

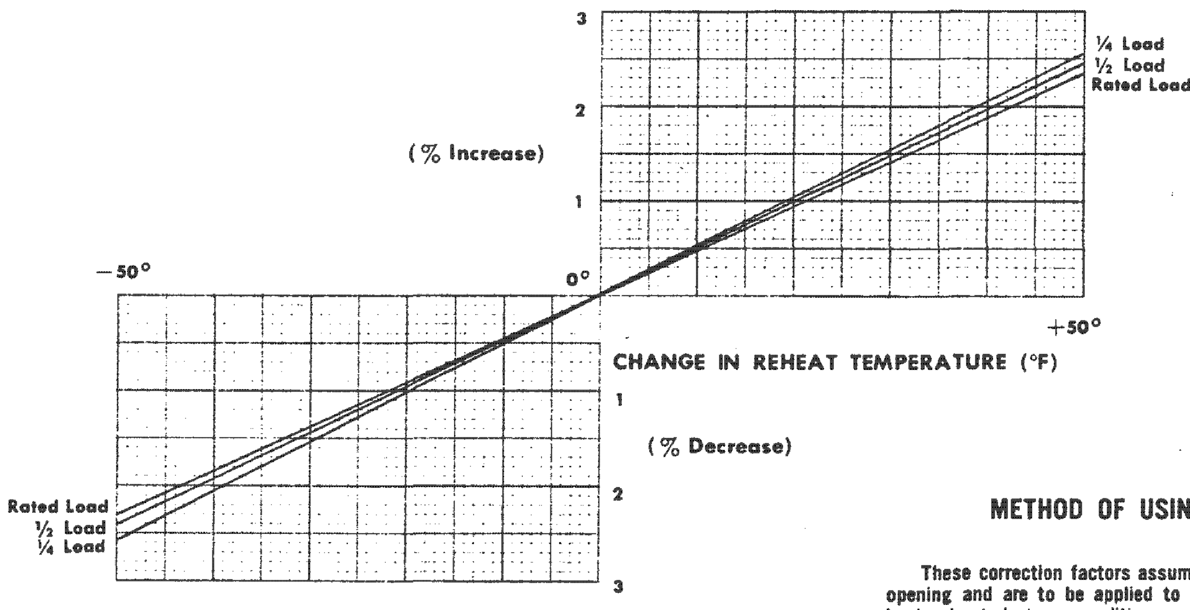
GENERAL ELECTRIC
FIG. B2

IP14_005182

REHEAT TEMPERATURE CORRECTION FACTORS

FOR SINGLE REHEAT UNITS

% CHANGE IN KILOWATT LOAD



METHOD OF USING CURVES

These correction factors assume constant control valve opening and are to be applied to heat rates and kilowatt loads at rated steam conditions.

1. The heat rate at the desired condition can be found by multiplying the heat rate at rated conditions by the following:

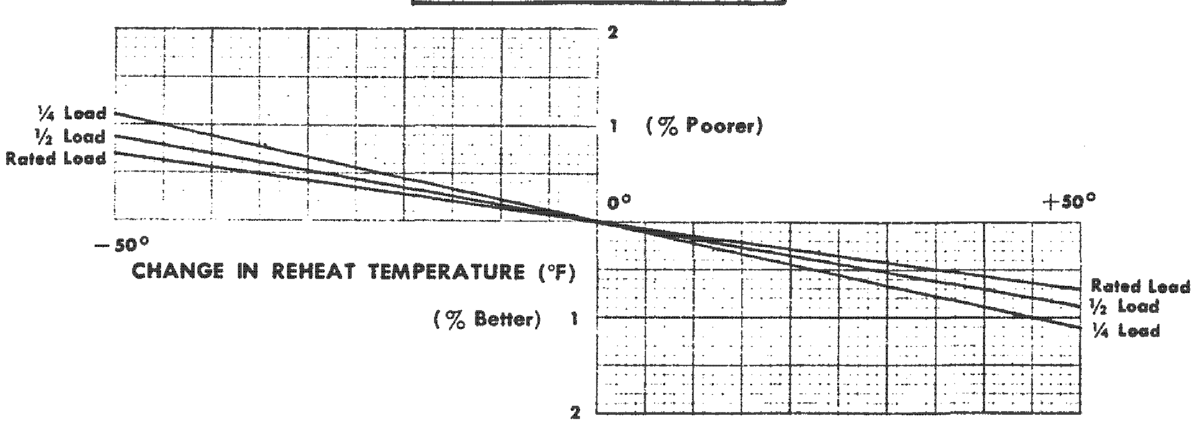
$$1 + \frac{\%\text{ change in gross heat rate}}{100}$$

2. The kilowatt load at the desired conditions can be found by multiplying the kilowatt load at rated conditions by the following:

$$1 + \frac{\%\text{ change in kw load}}{100}$$

3. These correction factors are not guaranteed.

% CHANGE IN HEAT RATE



GEZ-3617
2-71 (2M)

GENERAL ELECTRIC

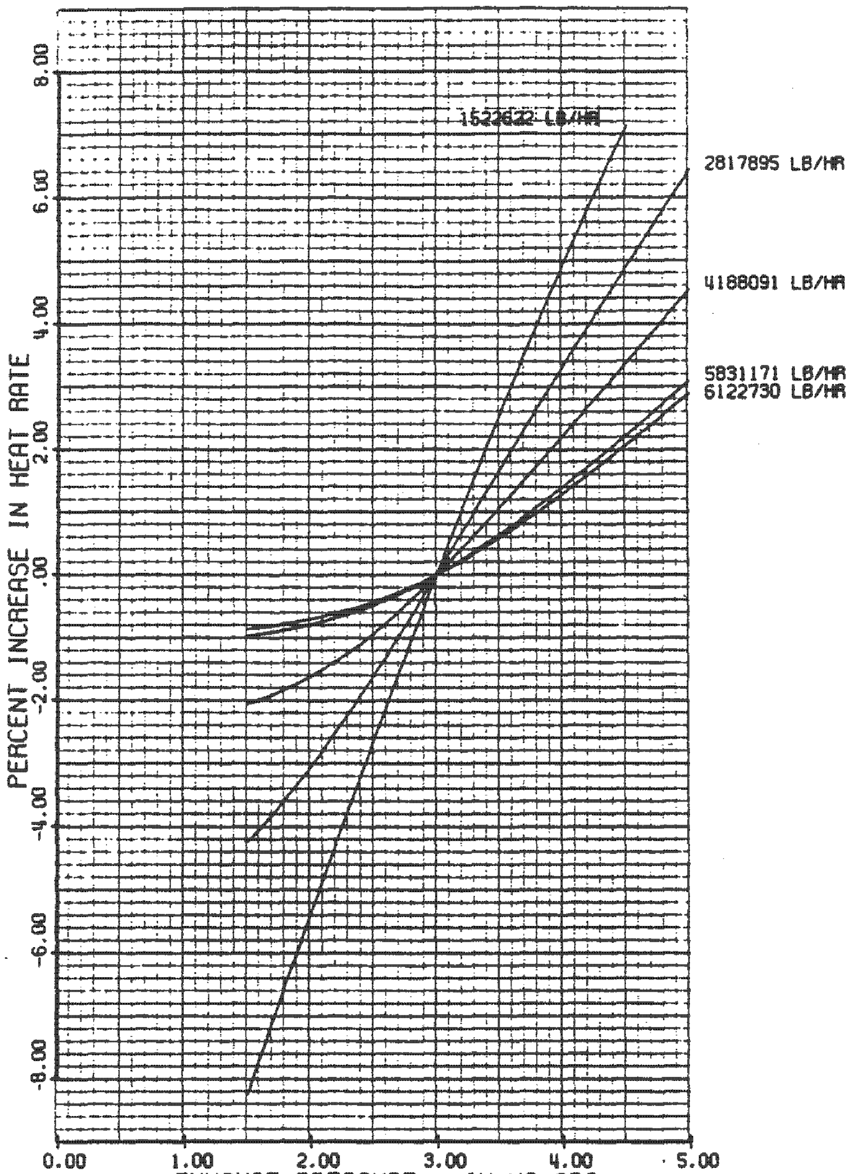
Fig B3

IP14_005183

EXHAUST PRESSURE CORRECTION FACTORS

820000 KW AT 1.66/ 2.24/ 2.99 IN HG ABS 1.00 PCT MU
TC6F-30.0 IN LSB 3600 RPM
2400 PSIA 1000/1000 T

481 HB 475



METHOD OF USING CURVE

VALUES NEAR CURVES ARE FLOWS AT 2400 PSIA 1000 T
THESE CORRECTION FACTORS ASSUME CONSTANT CONTROL VALVE OPENING
APPLY CORRECTIONS TO HEAT RATE AND KW LOADS
AT 2.99/ 2.24/ 1.66 IN HG ABS AND 0.0 PCT MU.

THE PERCENT CHANGE IN KW LOAD FOR VARIOUS EXHAUST PRESSURES IS EQUAL TO (MINUS PCT INCREASE IN HEAT RATE)100/(100 + PCT INCREASE IN HEAT RATE)

THESE CORRECTION FACTORS ARE NOT GUARANTEED

PRESSURES ALONG ABSCISSA ARE PRESSURES IN HOOD C

PRESSURE(IN HG ABS) FOR	HOOD C	HOOD B	HOOD A
	1.50	1.09	.78
	2.00	1.47	1.07
	2.50	1.85	1.36
	3.00	2.24	1.66
	3.50	2.63	1.96
	4.00	3.03	2.27
	4.50	3.42	2.58
	5.00	3.82	2.89

481 HB 475

FIG. B4

APPENDIX C

Correction To Heat Rate and Load

Notes:

Page C2 shows the measured values of heat rate and load corrected for group 2 corrections. These corrections include power factor, H_2 pressure, throttle pressure, throttle temperature, reheat temperature and exhaust pressure. No correction for off-design cycle conditions are included in the corrected test heat rate and load.

Page C3 shows the contract cycle heat rates and loads which represent the measured heat rate corrected to the specified cycle on the guarantee heat balance (i.e., group 1 corrections). The corrected contract cycle heat rates and loads have also been corrected for group 2 corrections and these are the final values of heat rate and load to compare to the guarantee values.

INTERMOUNTAIN POWER PROJECT
UNIT #2. 2791151

T E S T   H E A T   R A T E   A N D   L O A D

TEST POINT	2	3	4	5	6	7	8	9	10
SUMMARY OF TEST CONDITIONS:									
MEAS'D LOAD	855960	592031	859850	785980	860755	775096	898356	599736	789272
THROTTLE FLOW	6183909	4056100	6220163	5570279	6224013	5477861	6496919	3978528	5527099
THROTTLE PRESS.	2384.1	2399.8	2394	2393.8	2394.2	2388.9	2477.14	2393.3	2382.4
THROTTLE TEMP.	1004.9	1007.2	1000.8	1001.5	996.5	1006.6	988.2	1008.8	1001.7
HOT REHEAT TEMP.	1000.2	1001.3	1009.2	1006.2	1003.1	1004.3	996.3	1001.6	1007.5
EXHAUST PRESS.	3.739	3.074	3.809	3.403	3.599	3.513	3.195	2.063	2.956
POWER FACTOR	0.987	0.991	0.989	1	0.989	1	1	0.996	0.998
H2 PRESSURE	64	58	64	64	64	62	63	63	63
TEST HEAT RATE	7863.6	7986.8	7883.3	7866.2	7855	7872.3	7772.3	7762.8	7791.8
TEST LOAD	855119	591526	858986	785201	859887	774305	898356	599283	788480
HEAT RATE CORRECTIONS (dividing factors):									
PT	1.0007	1.0006	1.0005	1.0006	1.0005	1.0008	0.9983	1.0009	1.0010
TT	0.9993	0.9990	0.9999	0.9998	1.0006	0.9990	1.0019	0.9988	0.9997
THRH	1.0000	0.9998	0.9987	0.9991	0.9996	0.9994	1.0005	0.9997	0.9989
PEXH	1.0247	1.0219	1.0258	1.0217	1.0216	1.0245	1.0127	0.9935	1.0118
COMBINED CORR	1.0247	1.0212	1.0248	1.0211	1.0224	1.0237	1.0134	0.9929	1.0114
LOAD CORRECTIONS (dividing factors):									
PT	0.9885	0.9946	0.9926	0.9923	0.9927	0.9903	1.0264	0.9917	0.9876
TT	0.9996	0.9993	0.9999	0.9999	1.0004	0.9994	1.0012	0.9991	0.9999
THRH	1.0001	1.0006	1.0043	1.0029	1.0015	1.0020	0.9983	1.0008	1.0035
PEXH	0.9759	0.9786	0.9749	0.9788	0.9788	0.9760	0.9875	1.0066	0.9884
COMBINED CORR	0.9644	0.9732	0.9717	0.9740	0.9735	0.9679	1.0130	0.9981	0.9794
CORR TEST HEAT RATE	7674.2	7820.7	7692.2	7703.3	7683.2	7689.9	7669.5	7818.4	7704.2
CORR TEST LOAD	886683	607794	883979	806176	883276	799958	886810	600425	805040

FIG. C2

INTERMOUNTAIN POWER PROJECT
UNIT #2, 2707151

CONTRACT CYCLE HEAT RATE AND LOAD

TEST POINT	2	3	4	5	6	7	8	9	10
SUMMARY OF TEST CONDITIONS:									
MEAS'D LOAD	855960	592031	859850	785980	860755	775096	898356	599736	789272
THROTTLE FLOW	6183909	4056100	6220163	5570279	6224013	5477861	6496919	3978528	5527099
THROTTLE PRESS.	2384.1	2399.8	2394	2393.8	2394.2	2388.9	2477.14	2393.3	2382.4
THROTTLE TEMP.	1004.9	1007.2	1000.8	1001.5	996.5	1006.6	988.2	1008.8	1001.7
HOT REHEAT TEMP.	1000.2	1001.3	1009.2	1006.2	1003.1	1004.3	996.3	1001.6	1007.5
EXHAUST PRESS.	3.739	3.074	3.809	3.403	3.599	3.513	3.195	2.063	2.956
POWER FACTOR	0.987	0.991	0.989	1	0.989	1	1	0.996	0.998
H2 PRESSURE	64	58	64	64	64	62	63	63	63
CONTRACT CYCLE									
HEAT RATE	7958.85	8084.63	7984.94	7977.65	7951.25	7996.85	---------	7872.34	7897.17
LOAD	843804.9	586602	847508.8	775179.5	848153	763182.6	---------	593081.5	777947.4
HEAT RATE CORRECTIONS (dividing factors):									
PT	1.0007	1.0006	1.0005	1.0006	1.0005	1.0008	0.9983	1.0009	1.0010
TT	0.9993	0.9990	0.9999	0.9998	1.0006	0.9990	1.0019	0.9988	0.9997
THRH	1.0000	0.9998	0.9987	0.9991	0.9996	0.9994	1.0005	0.9997	0.9989
PEXH	1.0247	1.0219	1.0258	1.0217	1.0216	1.0245	1.0127	0.9935	1.0118
COMBINED CORR	1.0247	1.0212	1.0248	1.0211	1.0224	1.0237	1.0134	0.9929	1.0114
LOAD CORRECTIONS (dividing factors):									
PT	0.9885	0.9946	0.9926	0.9923	0.9927	0.9903	1.0264	0.9917	0.9876
TT	0.9996	0.9993	0.9999	0.9999	1.0004	0.9994	1.0012	0.9991	0.9999
THRH	1.0001	1.0006	1.0043	1.0029	1.0015	1.0020	0.9983	1.0008	1.0035
PEXH	0.9759	0.9786	0.9749	0.9788	0.9788	0.9760	0.9875	1.0066	0.9884
COMBINED CORR	0.9644	0.9732	0.9717	0.9740	0.9735	0.9679	1.0130	0.9981	0.9794
CORR TEST HEAT RATE	7767.2	7916.5	7791.4	7812.4	7777.4	7811.6	---------	7928.7	7808.4
CORR TEST LOAD	874951	602734	872168	795887	871223	788467	---------	594212	794286

Fig. C3

013-6 (7-70) PHOTO OFFSET-TDS

APPENDIX D

Enthalpy Drop Efficiency

INTERMOUNTAIN POWER PROJECT
UNIT # 2
Enthalpy Drop Startup Test Data

TEST PT.	1	2	3
VALVE PT.	2nd	3rd	VWO
THROTTLE P (psia)	1495.37	1212.0	1216.05
THROTTLE T (deg F)	1004.29	1003.82	1003.35
CRH P (psia)	283.70	293.41	324.00
CRH T (deg F)	609.43	643.84	659.15
VC P (psia)	1481.18	1197.10	1205.95
1st STG P (psia)	818.18	895.83	996.95
P1/PT	.5471	.7390	.8198
HP (effy.)	81.835	87.10	88.71
T (corr.)	+.035	+.033	+.030
P (corr.)	-.24	-.16	-.16
HTR (corr.)	+.80	+.60	+.60
HP (effy) corrd.	82.43	87.573	89.18
HRH P (psia)	262.3	269.24	297.38
HRH T (deg F)	972.78	995.14	996.94
LPB P (psia)	59.926	59.860	66.269
LPB T (deg F)	599.44	612.72	614.82
IP (effy.)	91.569	91.74	91.613
HTR (corr.) **	+.40	+.40	+.40
IP (effy) corrd.	91.969	92.14	92.013
HTR (Out Serv.)	6AB,7AB,8AB	6B,7B,8AB	6B,7B,8AB
Barometric Pres. (Psia)	12.54	12.5	12.48

** Data from Unit # 1 showed a change in performance level of 0.40% points with # 6 heater in service.

FIG. D1

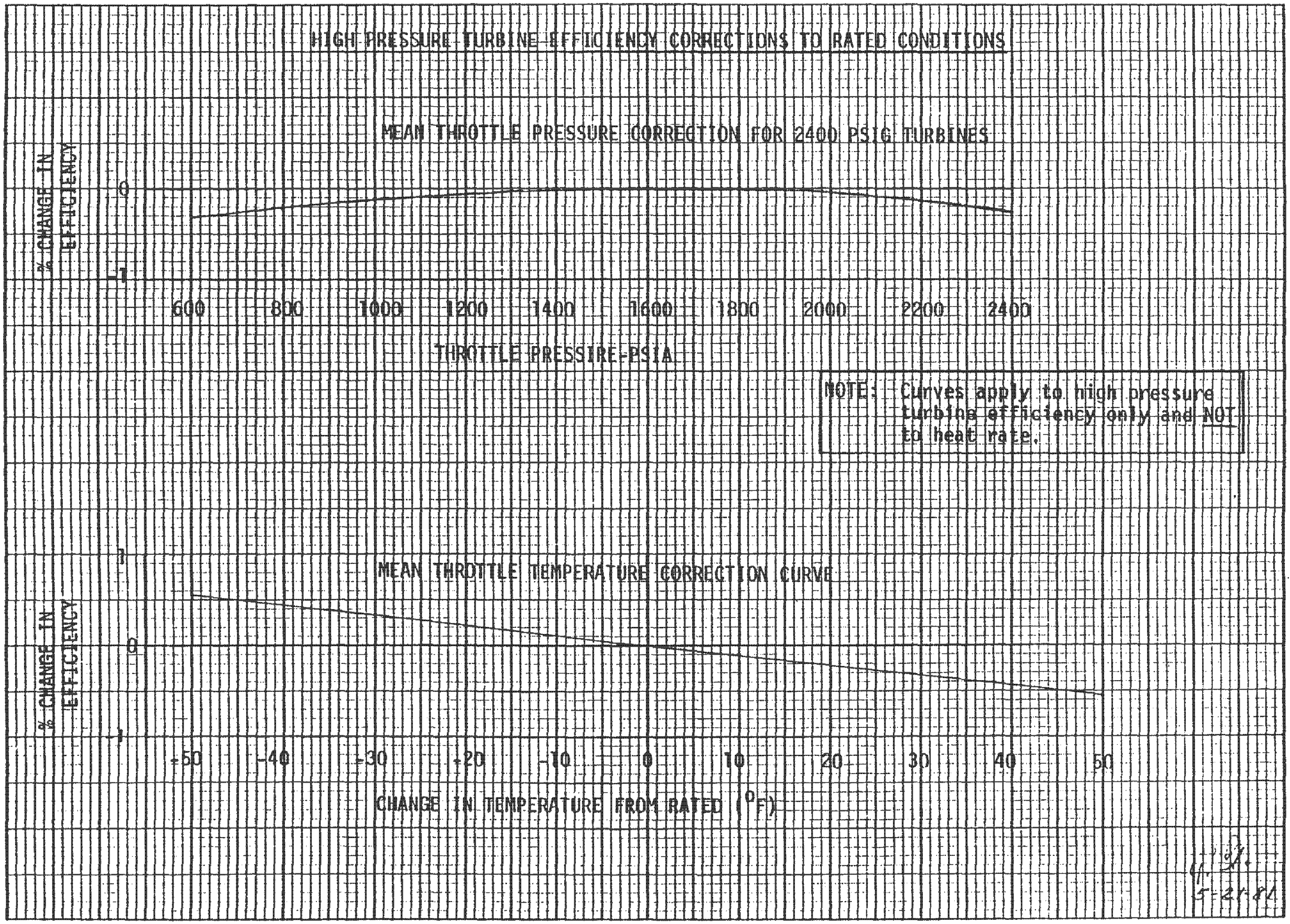

HIGH PRESSURE TURBINE EFFICIENCY CORRECTIONS TO RATED CONDITIONS
MEAN THROTTLE PRESSURE CORRECTION FOR 2400 PSIG TURBINES
% CHANGE IN EFFICIENCY
0
-1
600
800
1000
1200
1400
1600
1800
2000
2200
2400
THROTTLE PRESSIRE-PSIA
NOTE: Curves apply to high pressure turbine efficiency only and NOT to heat rate.
MEAN THROTTLE TEMPERATURE CORRECTION CURVE
% CHANGE IN EFFICIENCY
1
0
-1
-50
-40
-30
-20
-10
0
10
20
30
40
50
CHANGE IN TEMPERATURE FROM RATED (°F)
5-21-81

Fig. D2

ENTHALPY DROP EFFICIENCY TEST

A turbine section efficiency can be measured if superheated steam conditions exist at both the inlet and exhaust of the section and the steam is thoroughly mixed so that the average temperature can be measured. The efficiency is defined as the energy used divided by the isentropic energy that is available. See Figure 1.

It is customary practice to measure the efficiencies of the high pressure turbine and intermediate pressure turbine of fossil fired reheat turbines with this method.

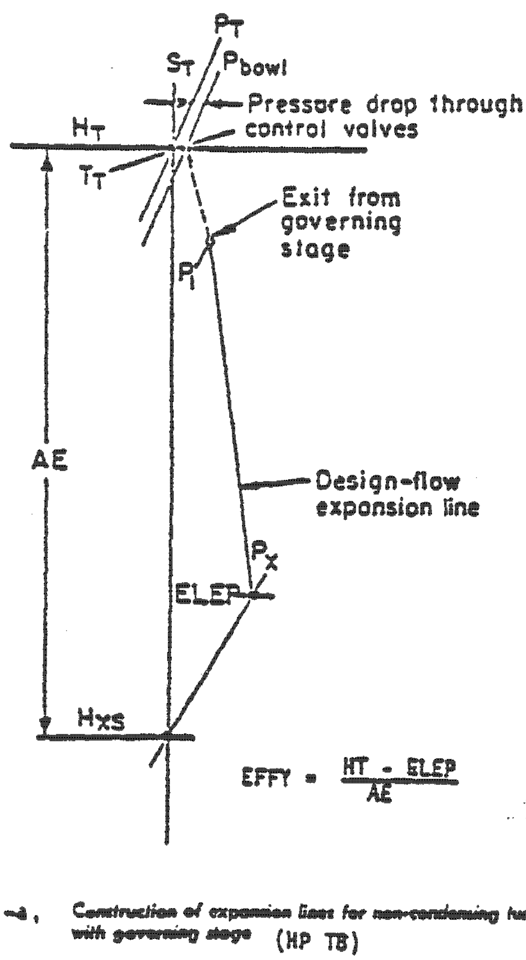


Fig. 1-a. Construction of expansion lines for non-condensing turbines with governing stage (HP TB)

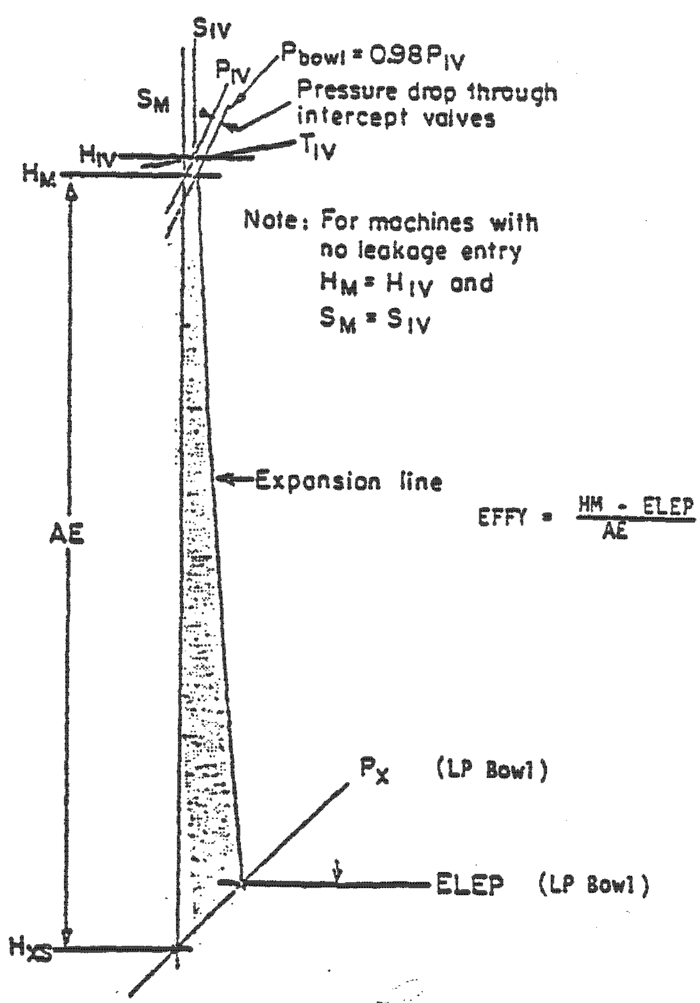


Fig. 1-b. Construction of expansion lines for IP turbines

To obtain an acceptable degree of accuracy and precision, the tests must be run by holding steam temperatures, pressures, and flows constant. Fluctuations of steam pressure should not exceed one percent of absolute pressure; temperature fluctuations should not exceed 5 F. Steam flows and load can be held constant by proper operation of the control mechanism. Care must be taken to insure that the turbine is up to operating temperature. After attaining steady conditions for at least half an hour, a test of one-hour duration with temperatures and pressures read at five-minute intervals should give satisfactory results.

The probable error of these section efficiencies is about 0.25 percent. This accuracy is based upon the ability to measure pressure within 0.1 percent at the throttle and reheat points, and 0.1 psi at the intermediate-pressure-section exhaust, and temperatures within 1/2 F. This probable error has been verified by comparing measured flow with calculated flow using enthalpy-drop efficiencies on the high-pressure section of cross-compound units.

Pressures above 35 psia should be measured with piston-type, dead-weight gages using calibrated weights.+ For a lower pressure a transducer may be used.

The design of a pressure tap should conform with the ASME Power Test Codes. Taps should be in a straight run of pipe, or at least not in or immediately adjacent to, a sharp turn, and should consist of a flush hole in the pipe wall. Care should be taken to remove any burrs.

The pressure connections should be located ahead of the turbine emergency stop valve, ahead of the intercept valve, in a cold reheat pipe near the high-pressure-section exhaust connection, and in the low-pressure-section bowl. If the intercept valve is directly connected to a reheat stop valve, then the pressure connection should be immediately ahead of the reheat stop valve. Figure locates these points of pressure measurements.

The pressure connection may be on the top, bottom, or side of a steam pipe provided certain precautions are taken to insure a definite water leg. If the connection is from the top or side of the steam pipe, the pressure-gage piping should be run horizontally and then dropped down. The same rule holds when the pressure gage is to be located above the pressure connection, i.e., there should be a downward loop in the gage line right near the pressure

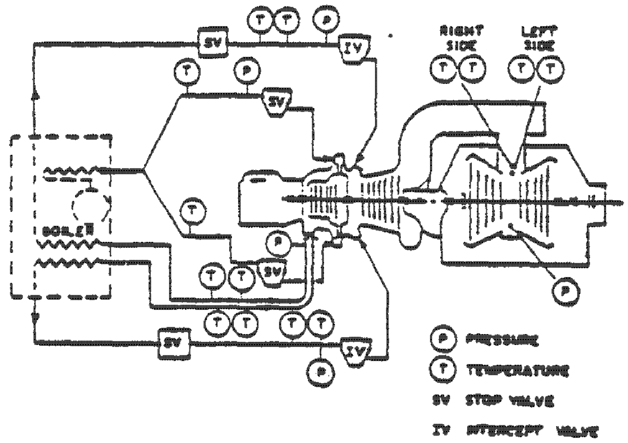


Fig. 2 *Schematic arrangement of pressure and temperature instrument locations*

connection. Pigtails are acceptable. These arrangements are shown in Fig. 3.

The pressure connection in the low-pressure-section bowl is located in the bottom of the bowl and is a 1/2-inch pipe, plugged at the end, and has several 1/4-inch diameter holes drilled through near the end of the pipe, Fig. 4.

For cross-compound turbines the intermediate-pressure-section exhaust pressure tap should be in the crossover pipe immediately downstream of the exhaust connection.

Temperatures should be measured with precision resistance thermometers or calibrated thermocouples and read on precision bridges and potentiometers.

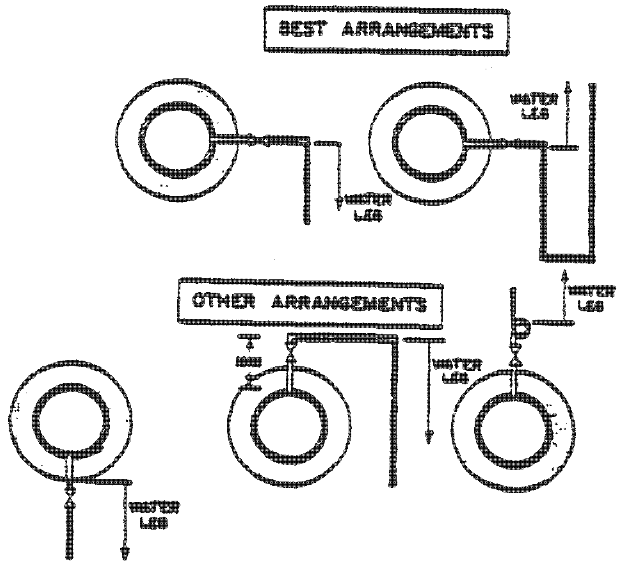


Fig. 3 Pressure-gage connections to steam pipes

+High accuracy transducers may be substituted if calibrated before and after the test.

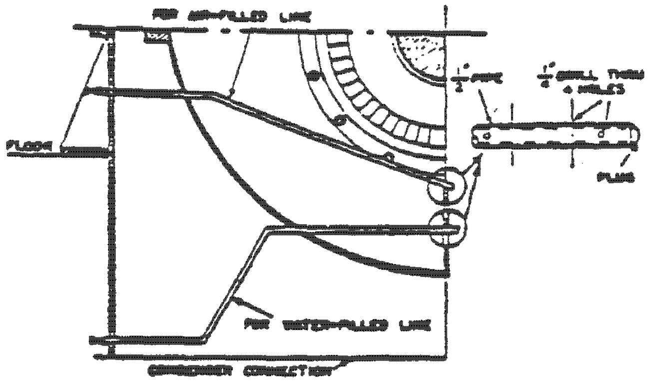


Fig. 4 Section through low-pressure turbine bowl showing pressure tap installation

It is recommended to duplicate temperature instrumentation. This will not only improve the accuracy of the data but will also detect a faulty temperature measurement. Placing the two thermowells in the top of a horizontal pipe so they are at about a 45-degree radial angle on each side of the vertical center line is a good scheme. The object is not to have two thermowells in line, Fig. 5.

When there are two separate steam leads from the boiler to the turbine, duplicate instrumentation in each lead is recommended, Fig. 2.

The length of the thermocouple well from the inner wall of pipe extending into the stream deserves attention in order to eliminate the error due to heat conduction up the thermocouple well wall. At the throttle the immersion should be > 2" and almost all standard installations are satisfactory. At the hot reheat point it is recommended that the immersion should be at least four inches if the outside diameter of the well is not greater than 1 1/2 inches. At the cold reheat point the immersion should be six inches. The location of the thermowells in the cold reheat line should be some distance downstream from the turbine and after at least one elbow to provide the proper mixing. The maximum distance from the turbine should not exceed 50 feet.

The thermocouple wells in the low-pressure-section bowl are made up of four 1/4-inch pipes which are securely fastened in the steam path. These probes should have radiation shields on their ends because the temperatures of all the wall surfaces in the bowl may be somewhat lower than the bowl steam temperature. A typical installation is shown in Fig. 6.

For cross-compound turbines,* two thermocouple wells should be in each crossover pipe located near the downstream end of the pipe. The immersion should be at least six inches if the outside diameter of the well is no greater than 1 1/2 inches.

Sample calculations of high-pressure and intermediate-pressure-section efficiencies are given in Table 1.

TABLE 1

SECTION EFFICIENCIES

High-pressure Section Efficiency

P_1 = 1815 psia　　P_2 = 430 psia
T_1 = 1000 F　　T_2 = 638.8 F
H_1 = 1480.3 Btu/lb　　H_2 = 1326.8 Btu/lb

Entropy = 1.5739 Btu/lb F

Isentropic end point = 1298.4 Btu/lb

$$\text{Efficiency} = \frac{1480.3 - 1326.8}{1480.3 - 1298.4} \times 100 = 84.4 \text{ percent}$$

Intermediate-pressure Section Efficiency

P_1 = 402.0 psia　　P_2 = 44.0 psia
T_1 = 1000 F　　T_2 = 470.0 F
H_1 = 1522.4 Btu/lb

H_{mix} Reheat Bowl =

$$\frac{^*710{,}290 \times 1522.4 + 21{,}300 \times 1450.8}{731{,}590} = 1520.3 \text{ Btu/lb}$$

* Flows estimated from design heat balances

Entropy P_1 and H_{mix} = 1.7600 Btu/lb F
Isentropic end point = 1244.9 Btu/lb

$$\text{Efficiency} = \frac{1520.3 - 1270.0}{1520.3 - 1244.9} \times 100 = 90.9 \text{ percent}$$

*or for tandem compound units with external pipes. In the near future all GE provisions will be in the crossover pipes.

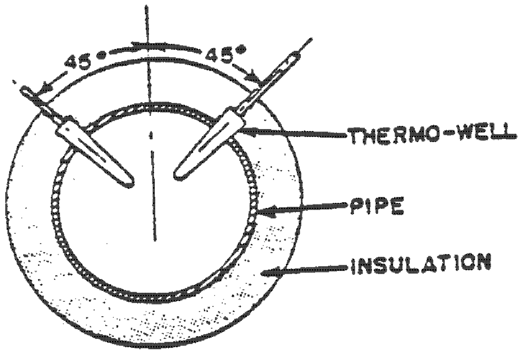


Fig. 5 Typical thermocouple-well arrangement

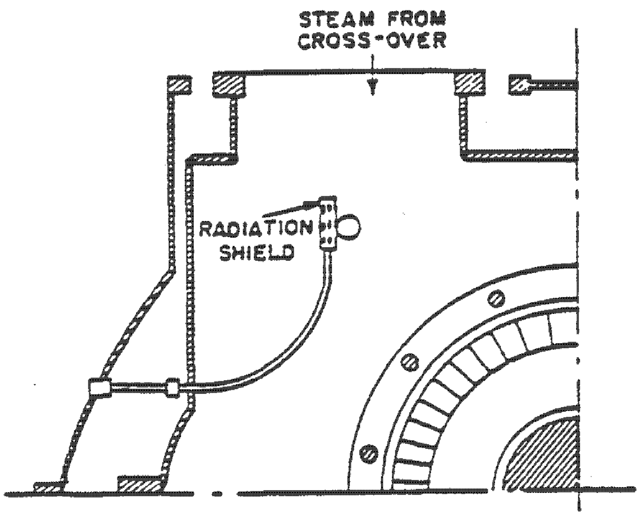


Fig. 6 Section through low-pressure turbine bowl showing thermocouple-well installation